Dell™ OptiPlex™ 755
User's Guide

Models: DCTR, DCNE, DCSM, and DCCY

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Notes, Notices, and Cautions

NOTE: A NOTE indicates important information that helps you make better use of your computer.

NOTICE: A NOTICE indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

CAUTION: A CAUTION indicates a potential for property damage, personal injury, or death.

If you purchased a Dell™ n Series computer, any references in this document to Microsoft® Windows® operating systems are not applicable.

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Models: DCTR, DCNE, DCSM, and DCC

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Finding Information

NOTE: Some features or media may be optional and may not ship with your computer. Some features or media may not be available in certain countries.

NOTE: Additional information may ship with your computer.

What Are You Looking For?	Find It Here
• A diagnostic program for my computer • Drivers for my computer • My computer documentation • My device documentation • Desktop System Software (DSS)	**Drivers and Utilities CD or DVD** **NOTE:** The *Drivers and Utilities* media may be optional and may not ship with your computer. Documentation and drivers are already installed on your computer. You can use the media to reinstall drivers (see "Reinstalling Drivers and Utilities" on page 357), to run the Dell Diagnostics (see "Dell Diagnostics" on page 353), or to access your documentation. Readme files may be included on your media to provide last-minute updates about technical changes to your computer or advanced technical-reference material for technicians or experienced users. **NOTE:** Drivers and documentation updates can be found at **support.dell.com**.
• How to set up my computer • Basic troubleshooting information • How to run the Dell Diagnostics • Tools and utilities	**Quick Reference Guide** **NOTE:** This document may be optional and may not ship with your computer. **NOTE:** This document is available as a PDF at **support.dell.com**.

What Are You Looking For?	Find It Here
• Warranty information • Terms and Conditions (U.S. only) • Safety instructions • Regulatory information • Ergonomics information • End User License Agreement	**Dell™ Product Information Guide**
• How to remove and replace parts • Specifications • How to configure system settings • How to troubleshoot and solve problems	**Dell™ OptiPlex™ User's Guide** *Microsoft Windows Help and Support Center* **1** Click **Start** or → **Help and Support**→ **Dell User and System Guides**→ **System Guides**. **2** Click the *User's Guide* for your computer.
• Service Tag and Express Service Code • Microsoft Windows License Label	**Service Tag and Microsoft® Windows® License** These labels are located on your computer. • Use the Service Tag to identify your computer when you use **support.dell.com** or contact support. • Enter the Express Service Code to direct your call when contacting support. **NOTE:** As an increased security measure, the newly designed Microsoft Windows license label incorporates a missing portion or "hole" to discourage removal of the label.

What Are You Looking For?	Find It Here
• Solutions — Troubleshooting hints and tips, articles from technicians, and online courses, frequently asked questions • Community — Online discussion with other Dell customers • Upgrades — Upgrade information for components, such as memory, the hard drive, and the operating system • Customer Care — Contact information, service call and order status, warranty, and repair information • Service and support — Service call status and support history, service contract, online discussions with technical support • Dell Technical Update Service — Proactive e-mail notification of software and hardware updates for your computer • Reference — Computer documentation, details on my computer configuration, product specifications, and white papers • Downloads — Certified drivers, patches, and software updates • Desktop System Software (DSS)— If you reinstall the operating system for your computer, you should also reinstall the DSS utility. DSS provides critical updates for your operating system and support for processors, optical drives, USB devices, and so on. DSS is necessary for correct operation of your Dell computer. The software automatically detects your computer and operating system and installs the updates appropriate for your configuration.	**Dell Support Website — support.dell.com** **NOTE:** Select your region or business segment to view the appropriate support site. To download Desktop System Software: **1** Go to **support.dell.com**, select your region or business segment, and enter your Service Tag. **2** Select **Drivers & Downloads** and click **Go**. **3** Click your operating system and search for the keyword *Desktop System Software*. **NOTE:** The support.dell.com user interface may vary depending on your selections.
• How to use Windows XP • How to work with programs and files • How to personalize my desktop	**Windows Help and Support** **1** To access Windows Help and Support: • In Windows XP, click **Start** and click **Help and Support**. • In Windows Vista®, click the Windows Vista Start button and click **Help and Support**. **2** Type a word or phrase that describes your problem, and then click the arrow icon. **3** Click the topic that describes your problem. **4** Follow the instructions on the screen.

What Are You Looking For?	Find It Here
• How to reinstall my operating system	**Operating System Media** **NOTE:** The *Operating System* media may be optional and may not ship with your computer. The operating system is already installed on your computer. To reinstall your operating system, use the *Operating System* media. See "Reinstalling Windows XP or Windows Vista" on page 363. After you reinstall your operating system, use the *Drivers and Utilities* media to reinstall drivers for the devices that came with your computer. Your operating system product key label is located on your computer. **NOTE:** The color of your media varies based on the operating system you ordered.

Before You Begin

This chapter provides procedures for removing and installing the components in your computer. Unless otherwise noted, each procedure assumes that the following conditions exist:

- You have performed the steps in "Turning Off Your Computer" on page 21 and "Before Working Inside Your Computer" on page 21.
- You have read the safety information in your Dell™ *Product Information Guide*.
- A component can be replaced by performing the removal procedure in reverse order.

Recommended Tools

The procedures in this document may require the following tools:

- Small flat-blade screwdriver
- Phillips screwdriver
- Flash BIOS update program floppy disk or CD

Turning Off Your Computer

NOTICE: To avoid losing data, save and close all open files and exit all open programs before you turn off your computer.

1. Shut down the operating system:
   a. Save and close all open files and exit all open programs.
   b. *In the Microsoft® Windows® XP operating system*, click **Start→ Shut Down→ Shut down**.

      In Microsoft Windows Vista®, click the Windows Vista Start button™, , in the lower-left corner of the desktop, click the arrow in the lower-right corner of the Start menu as shown below, and then click **Shut Down**.

      The computer turns off after the operating system shutdown process is complete.

NOTICE: Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 4 seconds to turn them off.

Before Working Inside Your Computer

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your own personal safety.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

NOTICE: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTICE: When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

NOTICE: To avoid damaging the computer, perform the following steps before you begin working inside the computer.

1. Turn off your computer.

NOTICE: To disconnect a network cable, first unplug the cable from your computer and then unplug it from the network wall jack.

2. Disconnect any telephone or telecommunication lines from the computer.
3. Disconnect your computer and all attached devices from their electrical outlets, and then press the power button to ground the system board.
4. If applicable, remove the computer stand (for instructions, see the documentation that came with the stand) and the cable cover, if attached (see "Cable Cover (Optional)" on page 237).

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

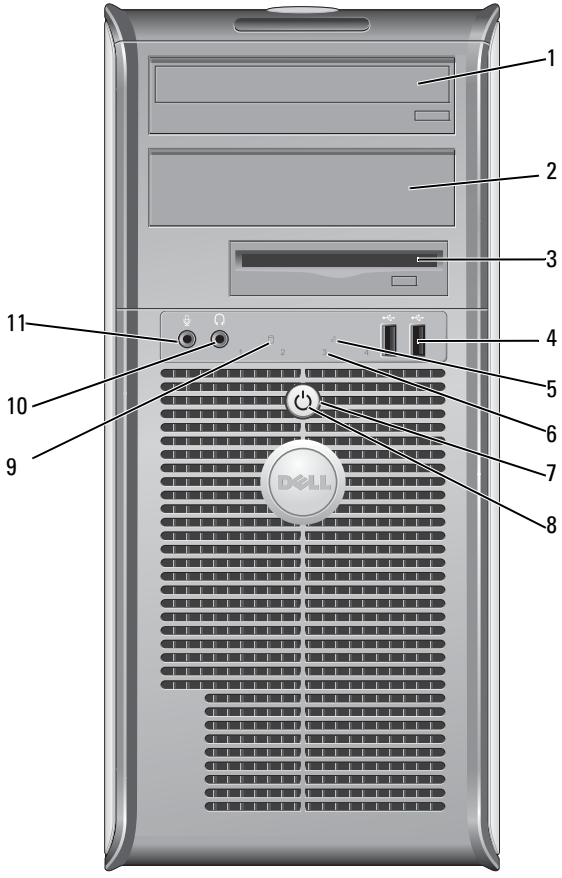
5. Remove the computer cover.
   - For a mini tower computer, see "Removing the Computer Cover" on page 27.
   - For a desktop computer, see "Removing the Computer Cover" on page 90.
   - For a small form factor computer, see "Removing the Computer Cover" on page 168.
   - For an ultra small form factor computer, see "Removing the Computer Cover" on page 232.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

Mini Tower Computer

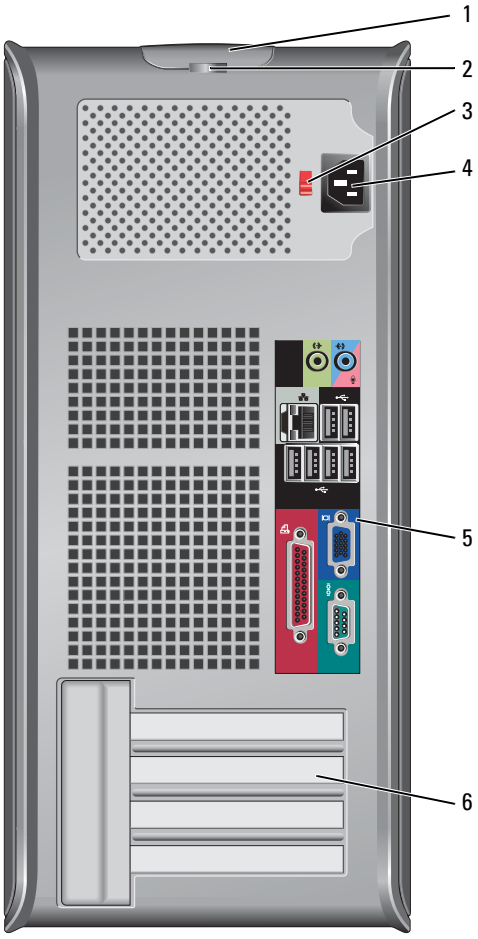
About Your Mini Tower Computer

Front View



1	5.25-inch drive bay	Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.
2	5.25-inch drive bay	Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.
3	3.5-inch drive bay	Can contain an optional floppy drive or optional media card reader.
4	USB 2.0 connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see your online *User's Guide* for more information on booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
5	LAN indicator light	This light indicates that a LAN (local area network) connection is established.
6	diagnostic lights	Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 347.
7	power button	Press this button to turn on the computer. **NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Before You Begin" on page 21 for more information. **NOTICE:** If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.
8	power light	The power light illuminates and blinks or remains solid to indicate different operating modes: • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — The computer is receiving electrical power, but an internal power problem may exist (see "Power Problems" on page 339). To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and power-saving mode, see "Advanced Features" on page 269. See "Diagnostic Lights" on page 347 for a description of light codes that can help you troubleshoot problems with your computer.
9	hard drive activity light	This light flickers when the hard drive is being accessed.
10	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
11	microphone connector	Use the microphone connector to attach a microphone.

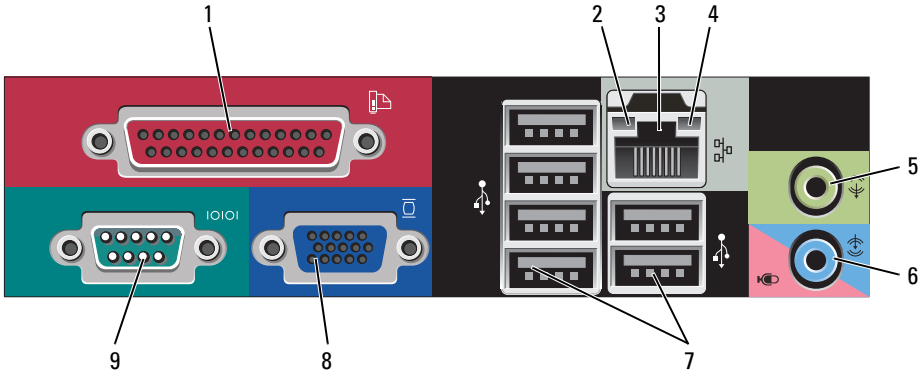
Back View



1	cover-release latch	This latch allows you to open the computer cover.
2	padlock ring	Insert a padlock to lock the computer cover.
3	voltage selection switch	Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage-selection switch, set the switch for the voltage that most closely matches the AC power available in your location. **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position. Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.

4	power connector	Insert the power cable.
5	back panel connectors	Plug serial, USB, and other devices into the appropriate connectors. See "Back Panel Connectors" on page 26.
6	card slots (4)	Access connectors for any installed PCI or PCI Express cards, PS/2 connector, eSATA connector, etc.

Back Panel Connectors



1	parallel connector	Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. **NOTE:** The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 281.
2	link integrity light	• Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer. • Off — The computer is not detecting a physical connection to the network.

3	network adapter connector	To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **NOTE:** Do not plug a telephone cable into the network connector. For VPro to work, the network cable must be connected to the onboard NIC. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
4	network activity light	Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
5	line-out connector	Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.
6	line-in/microphone connector	Use the blue and pink line-in/microphone connector to attach a record/playback device such as a cassette player, CD player, or VCR.; or a personal computer microphone for voice or musical input into a sound or telephony program.
7	USB 2.0 connectors (6)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
8	video connector	Plug the cable from your VGA-compatible monitor into the blue connector. **NOTE:** If you purchased an optional graphics card, this connector will be covered by a cap. Connect your monitor to the connector on the graphics card. Do not remove the cap. **NOTE:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.
9	serial connector	Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2. For more information, see "System Setup Options" on page 281.

Removing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

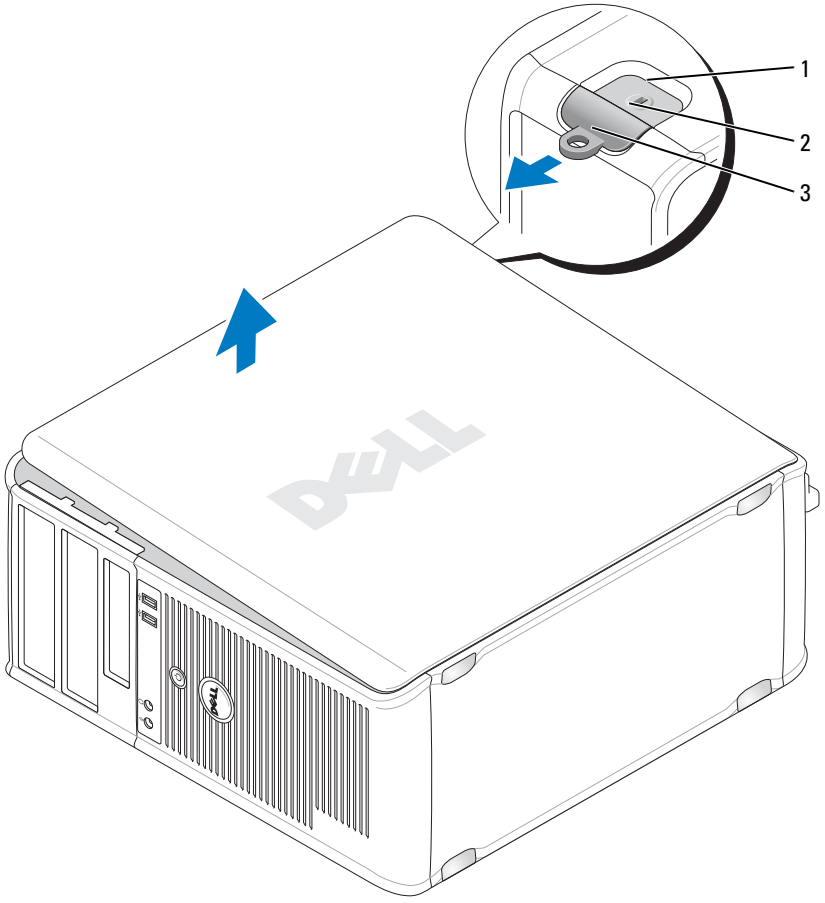
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in "Before You Begin" on page 21.
2. Lay the computer on its side as shown in the illustration.
3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.

4 Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.

5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.



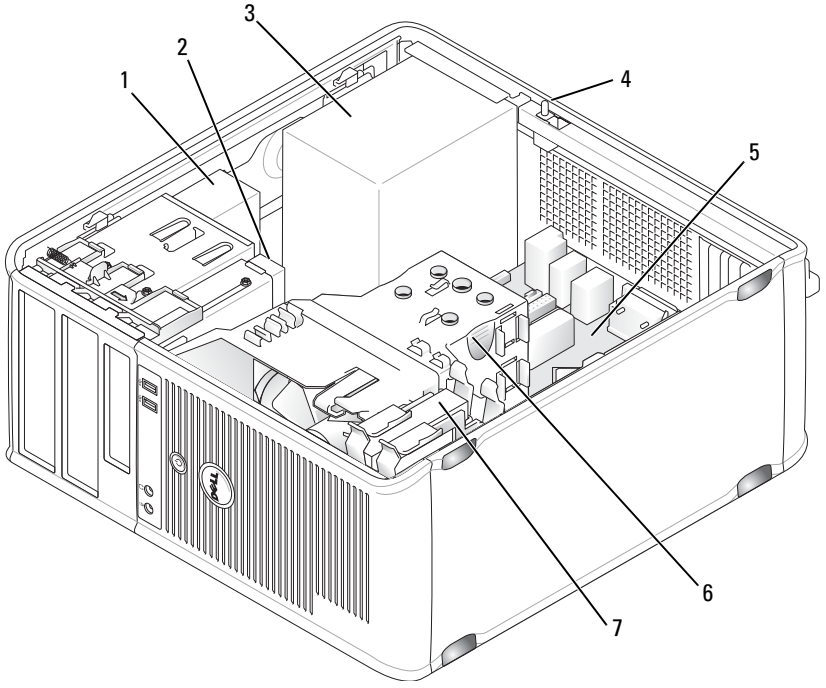
1 security cable slot 2 cover release latch 3 padlock ring

Inside Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



1	optical drive	2	disk drive	3	power supply
4	optional chassis-intrusion switch	5	system board	6	heat sink assembly
7	hard drive				

Chassis Intrusion Switch

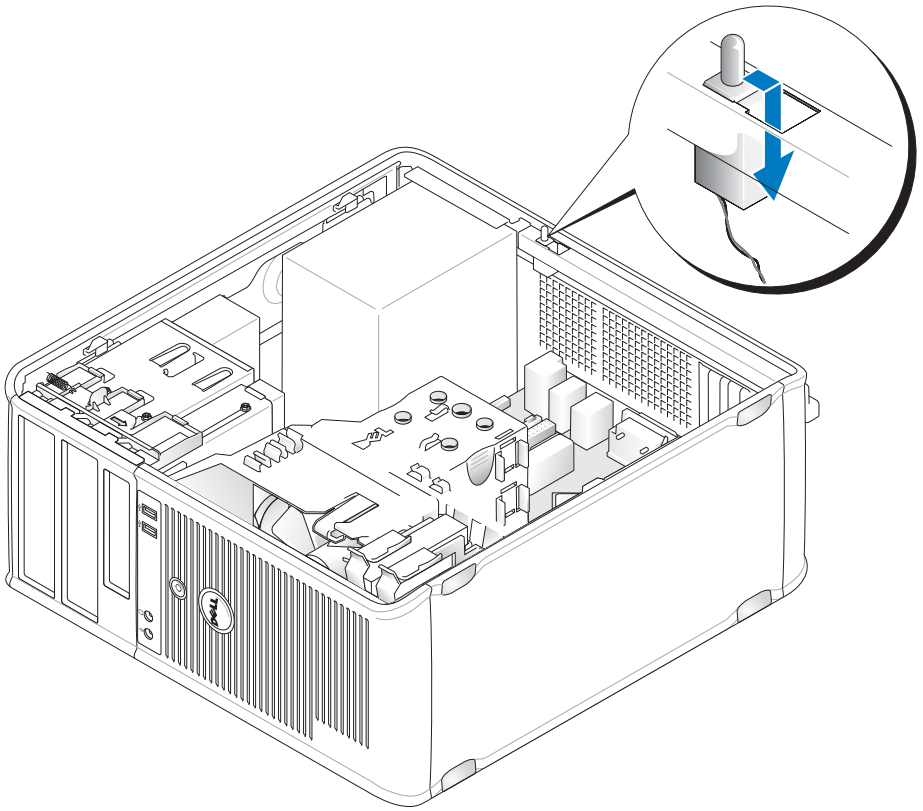
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop and small form factor computers; it may not be present on your computer.

Removing the Chassis Intrusion Switch

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).
3. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.
4. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

NOTE: You may feel a slight resistance as you slide the switch out of the slot.



Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until you feel it snap securely into place.
2. Reconnect the cable to the system board.
3. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

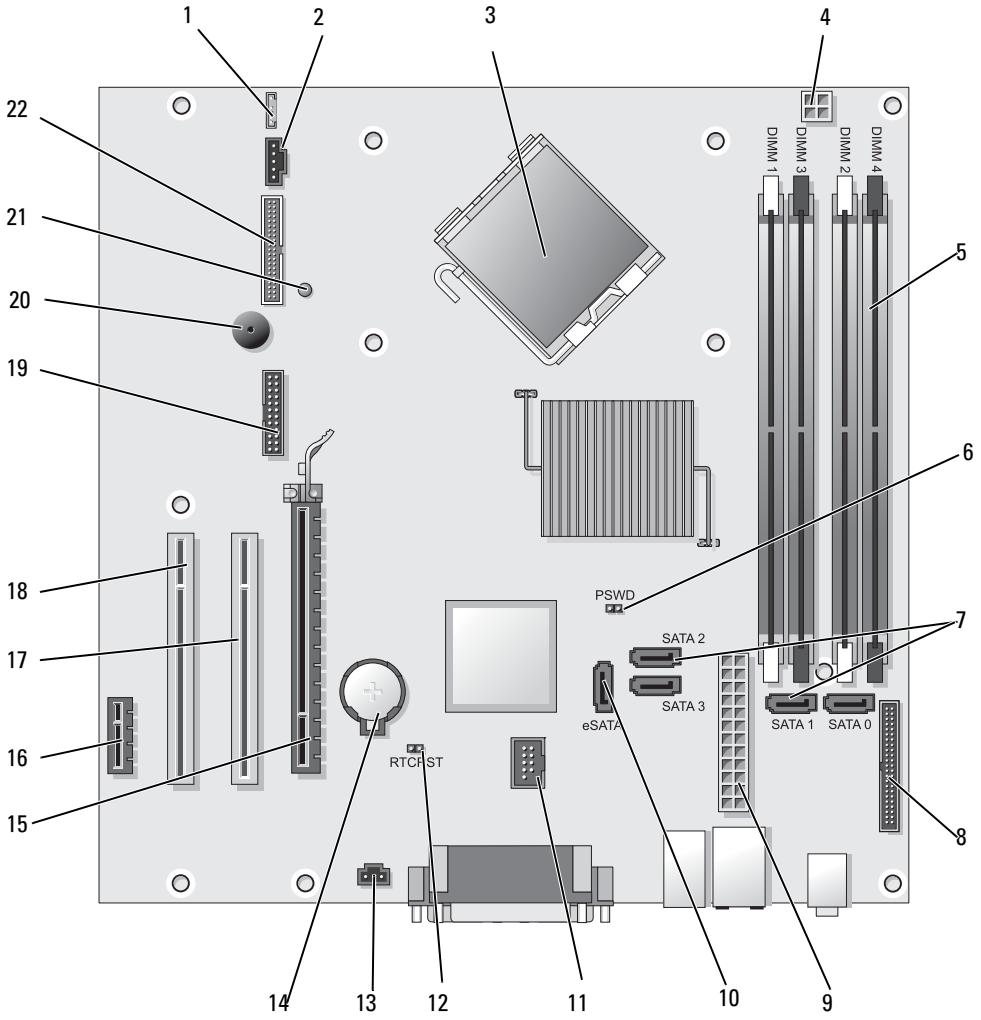
Resetting the Chassis Intrusion Detector

1. Turn on (or restart) your computer.
2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.
3. Select the **Chassis Intrusion** option and then press the left- or right-arrow key to select **Reset**. Change the setting to **On**, **On-Silent**, or **Disabled**.

   NOTE: The default setting is **On-Silent**.
4. Save your BIOS settings and exit system setup.

System Board Components



1 speaker connector (INT_SPKR)

2 fan (FAN_CPU)

3 processor connector (CPU)

4 processor power connector (12VPOWER)

5 memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)

12 RTC reset jumper (RTCRST)

13 intrusion switch connector (INTRUDER)

14 battery socket (BATTERY)

15 PCI Express x16 connector (SLOT1)

16 PCI Express x1 connector (SLOT4)

6	password jumper (PSWD)	17	PCI connector (SLOT2)
7	SATA drive connectors (SATA0, SATA1, SATA2, SATA3)	18	PCI connector (SLOT3)
8	front-panel connector (FRONTPANEL)	19	serial connector (SERIAL2)
9	power connector (POWER)	20	system board speaker (BEEP)
10	external SATA connector (eSATA)	21	aux power LED (aux_LED)
11	internal USB (INT_USB)	22	floppy connector (DSKT)

Mini Tower Computer Specifications

Microprocessor	
Microprocessor type	The following are supported: • Intel® Core™2 • Intel vPro™ • Intel Celeron®
Internal cache	L1: up to 128 KB; L2: up to 8 MB (depending on your processor)

Memory	
Type	667-MHz or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	512-MB, 1-GB, or 2-GB non-ECC
Minimum memory	dual-channel: 1 GB single-channel: 512 MB **NOTE:** 512 MB is the minimum shipping configuration.
Maximum memory	64-bit operating system: 8 GB 32-bit operating system: 4 GB
BIOS address	F0000h

Computer Information	
Chipset	Intel Q35 Express Chipset w/ICH9DO
Data bus width	64 bits
Address bus width	32 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	32 Mb
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication iAMT 3.0

Video	
Type	Intel Graphics Media Accelerator 3100 or DVI add-in card in PCI Express x16 slot or PCI Express x16 graphics card
Audio	
Type	ADI 1984 High Definition Audio
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog
Controllers	
Drives	four SATA controllers and one eSATA controller supporting one device each
Expansion Bus	
Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
Bus speed	PCI: 133 MB/s PCI Express x16: 8 GB/s bidirectional speed PCI Express x1: 5 Gbps SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps
Cards:	full-height cards supported
PCI:	
connectors	two
connector size	two 164 pin connectors
connector data width (maximum)	32 bits
PCI Express:	
connectors	one x1 and one x16
power	10 W (x1) and 75 W (x16) maximum
connector size	36 pins (x1) and 164 pins (x16)
connector data width (maximum)	one PCI Express lane (x1) and 16 PCI Express lanes (x16)

Drives	
Internally accessible	• Two SATA (Serial ATA) hard drives • One3.5-inch floppy drive or media reader • Two SATA optical drives
Externally accessible	One eSATA drive (optional)

Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Video	15-pin VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs
USB	two front-panel and six back panel USB 2.0–compliant connectors
Audio	two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	four 7-pin connectors
eSATA	one 7-pin connector
Floppy drive	34-pin connector
Serial	12-pin connector for optional second PS/2 serial port card
Fan	5-pin connector
PCI 2.2	three 120-pin connectors
PCI Express	one 120-pin (x16) connector
Front panel	40-pin connector

Key Combinations	
<Ctrl><Alt><Del>	In Microsoft® Windows® XP, brings up the **Windows Security** window. If in MS-DOS® mode, restarts (reboots) the computer.
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during start-up only)
<F3>	automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup **Boot Sequence** option (during start-up only)

Key Combinations	
<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during start-up only) as well as options to run hard drive and system diagnostics
<Ctrl><p>	displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

Controls and Lights	
Power control	push button
Power light	green light — blinking green indicates sleep mode; solid green indicates power-on state. amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See "Power Problems" on page 339.)
hard drive access light	green
Link light (on front of chassis)	solid green light indicates network connection
Link integrity light (on integrated network adapter)	green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	yellow blinking light
Diagnostic lights	four lights on the front panel (See "Diagnostic Lights" on page 347.)
Standby power light	AUX_PWR on the system board

Power	
DC power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws a minute amount of power from the internal coin cell battery even when the computer is not drawing power from the AC power source.
Wattage	305 W
Heat dissipation	1041 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
Voltage	manual selection power supplies—90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	41.4 cm (16.3 inches)
Width	18.5 cm (7.3 inches)
Depth	43.9 cm (17.3 inches)
Weight	12.34 kg (27.2 lb)
Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	–15.2 to 3048 m (–50 to 10,000 ft)
Storage	–15.2 to 10,668 m (–50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

Cards

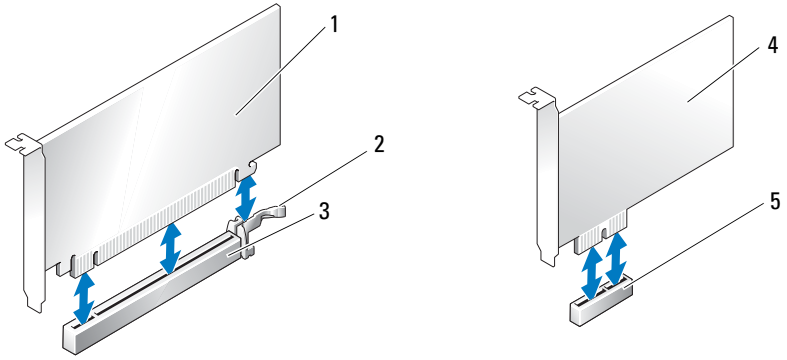
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintains the airflow that cools your computer.

Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- Two PCI card slots
- One PCI Express x16 card slot
- One PCI Express x1 card slot



1	PCI Express x16 card	4	PCI Express x1 card
2	securing tab (only for PCI Express cards)	5	PCI Express x1 card slot
3	PCI Express x16 card slot		

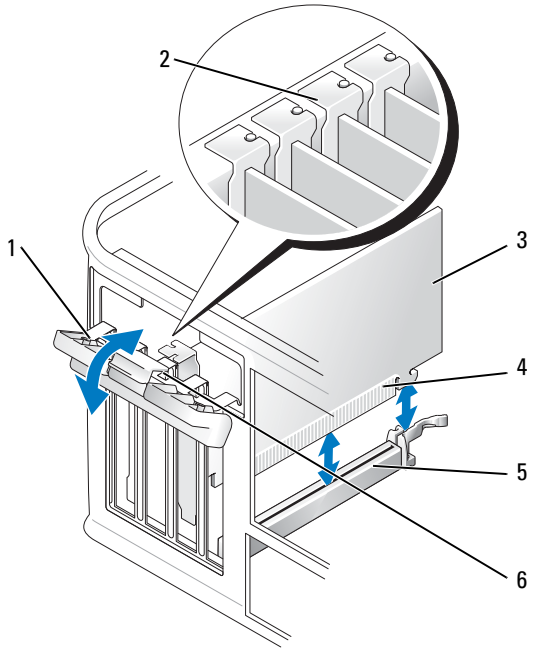
Installing a PCI or PCI Express Card

NOTE: Your Dell computer uses only PCI and PCI Express slots.

NOTE: The serial port adapter for your mini tower computer includes two PS/2 connectors.

If you are replacing a card, uninstall the driver for the existing card. See the documentation that came with the card for instructions.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).
3. Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



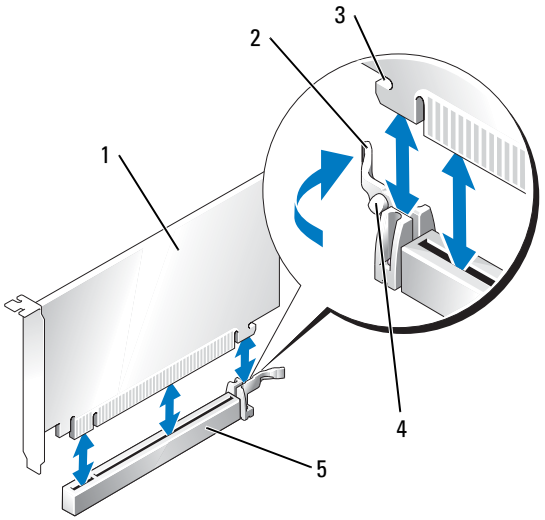
1	card retention latch	2	alignment guide	3	card
4	card-edge connector	5	card connector	6	release tab

4. If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
5. If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card.
6. If your card includes a card retention bar, remove the bar. Gently pull the securing tab, grasp the card by its top corners, and ease it out of its connector.
7. Prepare the new card for installation.

NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer

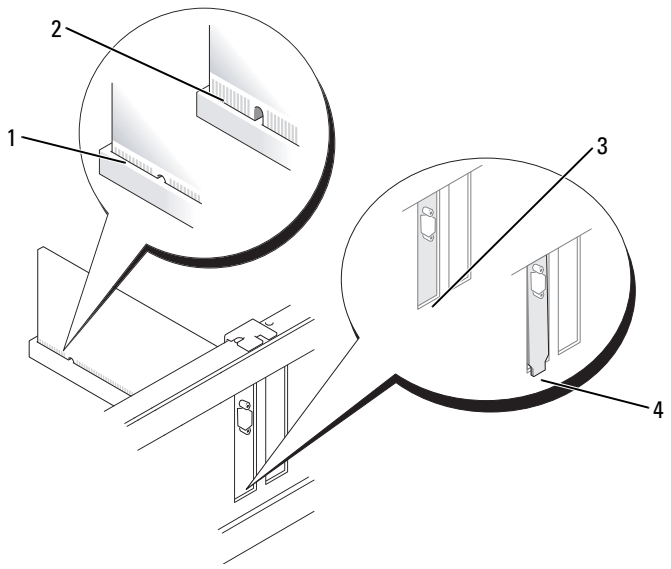
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

8 If you are installing the card into the x16 card connector, position the card so that the securing slot is aligned with the securing tab, and gently pull the securing tab.



1	PCI Express x16 card	2	lever	3	securing slot (not all cards)
4	securing tab	5	PCI Express x16 card connector		

9 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1	card fully seated	2	card not fully seated
3	bracket within slot	4	bracket caught outside of slot

10 Before you lower the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

11 Secure the card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

12 Connect any cables that should be attached to the card.

See the documentation for the card for information about the card's cable connections.

13 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

14 If you installed a sound card:

a Enter system setup, select **Audio Controller**, and change the setting to **Off** (see "System Setup" on page 280).

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel of the computer.

15 If you installed an network adapter card and want to turn off the integrated network adapter:

a Enter system setup, select **Network Controller**, and change the setting to **Off** (see "System Setup" on page 280).

b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

NOTICE: If you disable the integrated network adapter, you will not have AMT functionality.

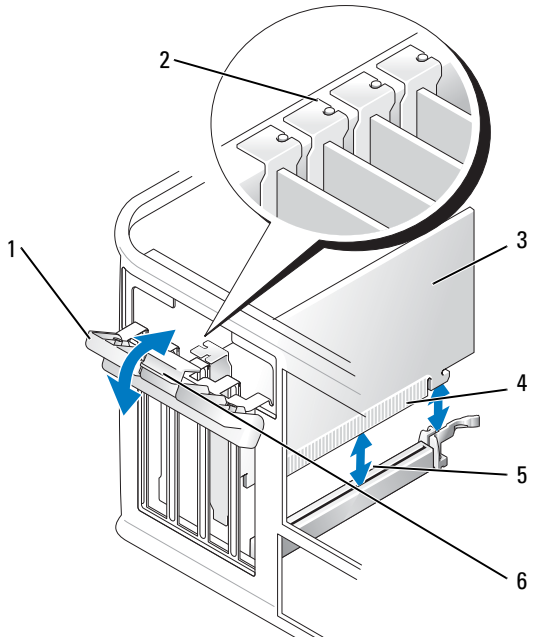
16 Install any drivers required for the card as described in the card documentation.

Removing a PCI or PCI Express Card

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

3 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



1	card retention latch	2	alignment guide	3	card
4	card-edge connector	5	card connector	6	release tab

4 If necessary, disconnect any cables connected to the card.

5 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintains the airflow that cools your computer.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

6 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

7 Uninstall the card's driver. See the documentation that came with the card for instructions.

8 If you removed a sound card:

a Enter system setup, select **Audio Controller**, and change the setting to **On** (see "System Setup" on page 280).

b Connect external audio devices to the audio connectors on the back panel of the computer.

9 If you removed a network-adapter card connector:

a Enter system setup, select **Network Controller**, and change the setting to **On** (see "System Setup" on page 280).

b Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapter

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

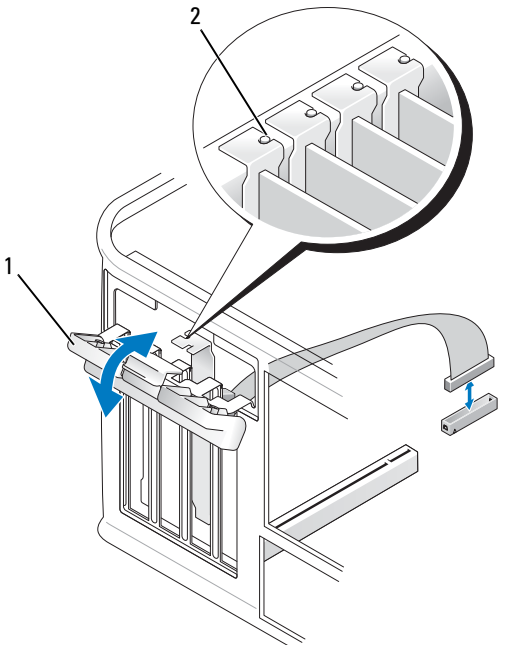
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

3 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position

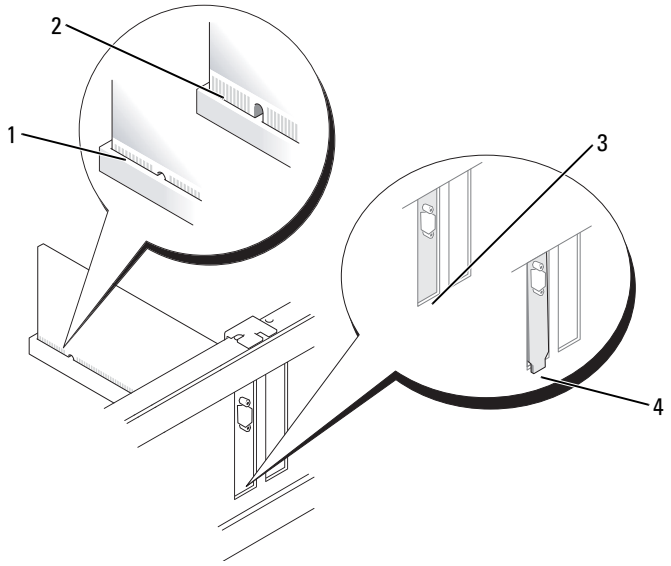


1 card retention latch 2 alignment guide

4 Remove the filler bracket (if applicable).

NOTE: See the documentation that came with the PS/2 serial port adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

5 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.



1	card fully seated	2	card not fully seated
3	bracket within slot	4	bracket caught outside of slot

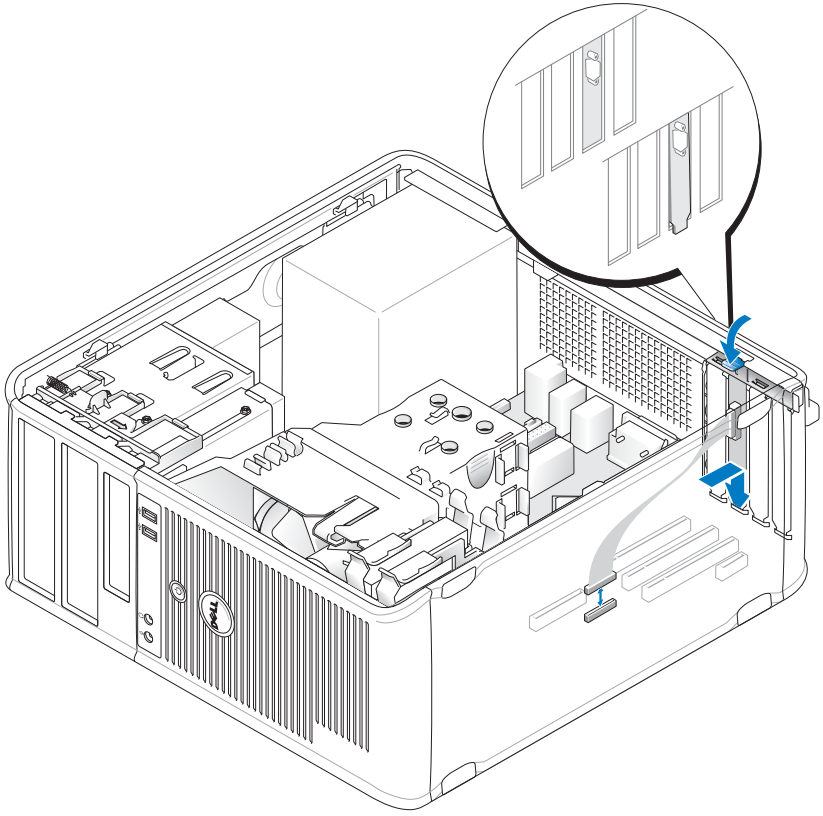
Before you close the card retention mechanism, ensure that:

- The tops of all adapters and filler brackets are flush with the alignment bar.
- The notch in the top of the adapter or filler bracket fits around the alignment guide.

6 Close the card retention latch and gently press until it snaps into place.

NOTICE: Do not route cables over any installed cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

7 Connect the adapter cable to the serial port adapter connector (SERIAL2) on the system board (see "System Board Components" on page 32 for connector locations).



NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

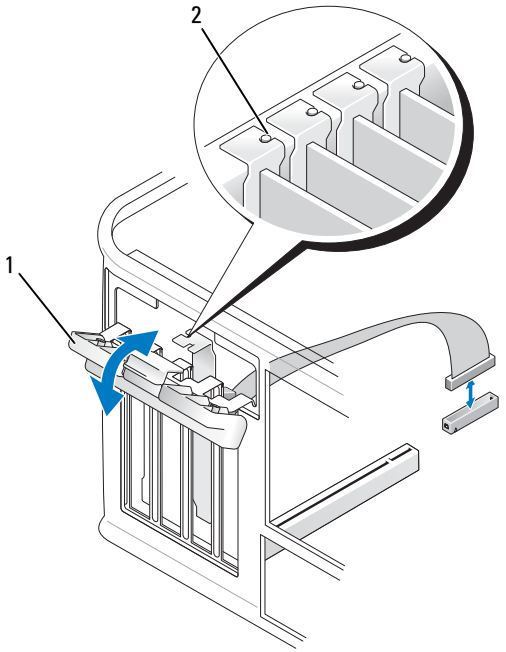
8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Removing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

3 Gently push the release tab on the card retention latch from the inside to pivot the latch open. The latch will remain in the open position.



1 card retention latch 2 alignment guide

4 Disconnect the PS/2 serial adapter cable from the system board (see "System Board Components" on page 32).

5 If necessary, disconnect any external cables connected to the adapter.

6 Ease the PS/2 serial-port adapter bracket out of its retention slot.

7 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer and maintains the airflow that cools your computer.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure the card(s) by closing the card retention latch and snapping it into place.

10 Replace the computer cover (see"Replacing the Computer Cover" on page 317).

Installing eSATA

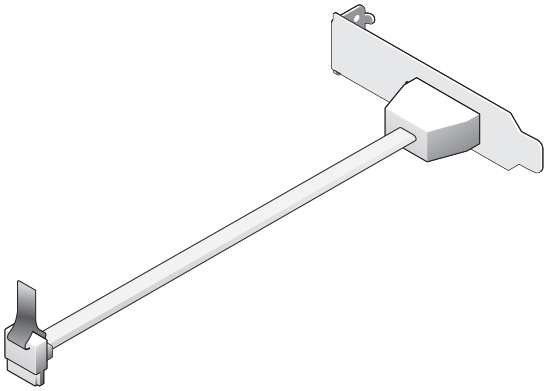
eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chipset, approximately six times the data throughput of USB.

eSATA on your computer also supports *hot-plugging*. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

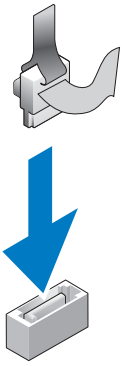
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Remove the computer cover (see "Removing the Computer Cover" on page 27).
2. Remove the filler panel for the card slot you are using for the eSATA connector.
3. Mount the bracket into the desired card slot opening.



4 Plug the free end of the eSATA cable into the eSATA connector on the system board.



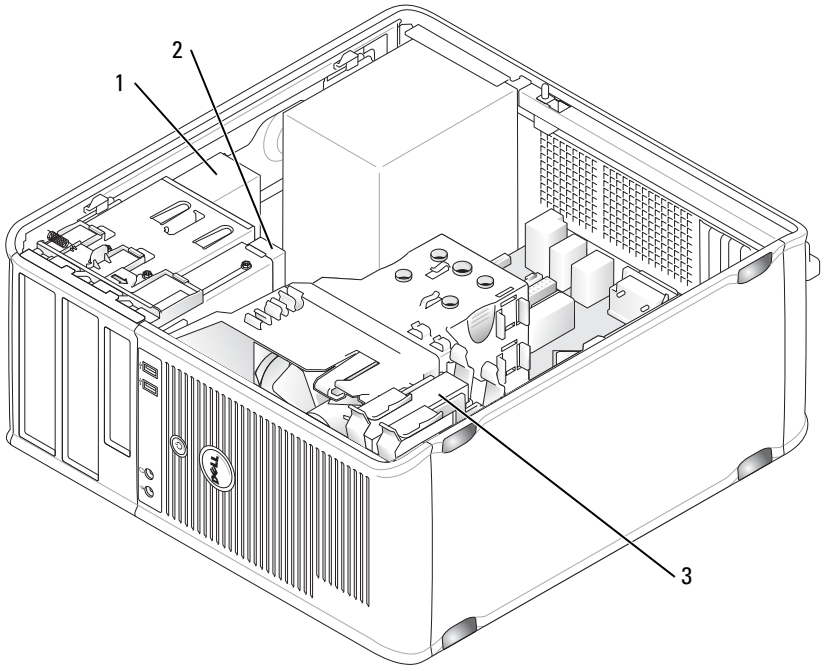
5 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

6 Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the `esata` option to enable the esata drive.

Drives

Your computer supports:

- Two SATA (Serial ATA) hard drives
- One 3.5-inch floppy drive or media card reader
- Two SATA optical drives
- One eSATA drive (with optional bracket)



1	optical drive	2	3.5-inch drive or media card reader	3	hard drive

General Drive Installation Guidelines

SATA connectors on the system board are labeled SATA0, SATA1, SATA2, and SATA3.

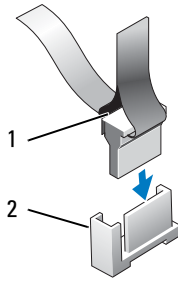
Hard drives must be connected to the lower numbered SATA connectors, while any other SATA devices (like an optical drive) must be connected to the remaining SATA connectors numbered higher than the one that the hard drive(s) is connected to. For example, if you have two SATA hard drives and one SATA optical drive, connect the two hard drives to the SATA0 and SATA1 connectors, and connect the SATA optical drive to the SATA2 connector. (See "System Board Components" on page 32 for the location of SATA connectors on the system board.)

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

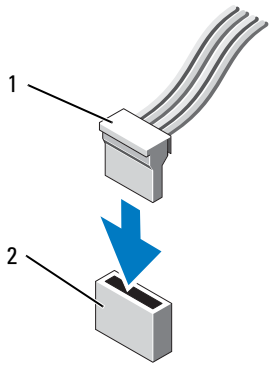
Data Interface Connectors

SATA Connector



1 data interface cable connector 2 data interface connector

Power Cable Connectors

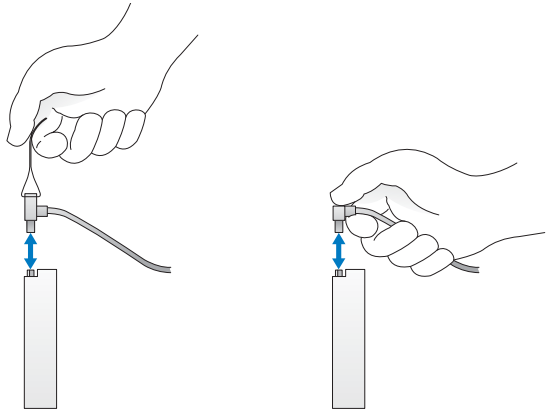


1 power cable 2 power input connector

Connecting and Disconnecting Drive Cables

When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a cable without a pull tab, hold the cable by the black connector at each end.



Hard Drive

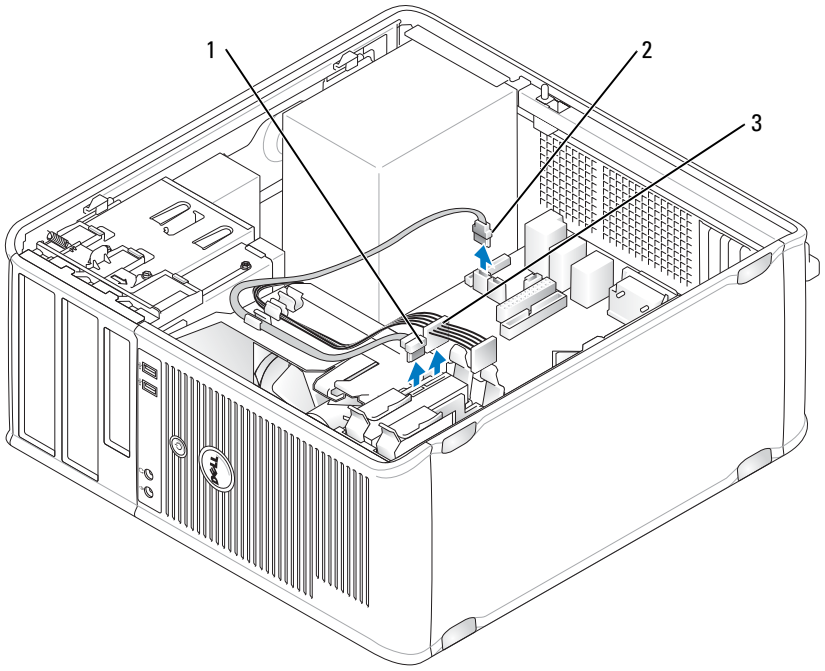
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

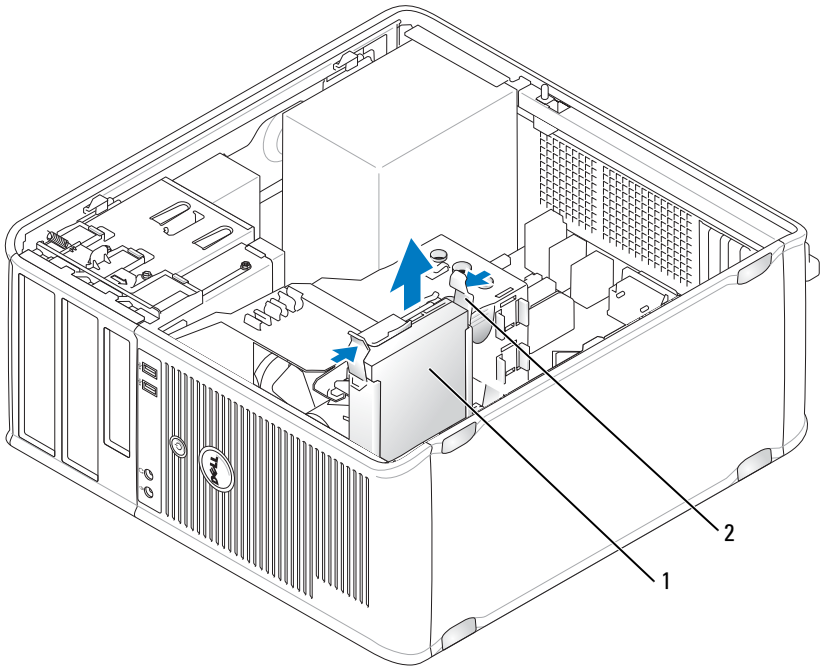
Removing a Hard Drive

1. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
2. Check the documentation for the drive to verify that it is configured for your computer.
3. Follow the procedures in "Before You Begin" on page 21.
4. Remove the computer cover (see "Removing the Computer Cover" on page 27).
5. Disconnect the power and data cables from the drive.



1	data cable	2	hard drive system board connector	3	power cable

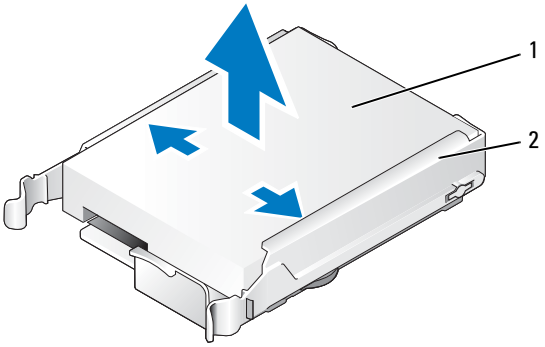
6 Press in on the blue release tabs on each side of the drive and slide the drive up and out of the computer.



1 hard drive 2 release tabs (2)

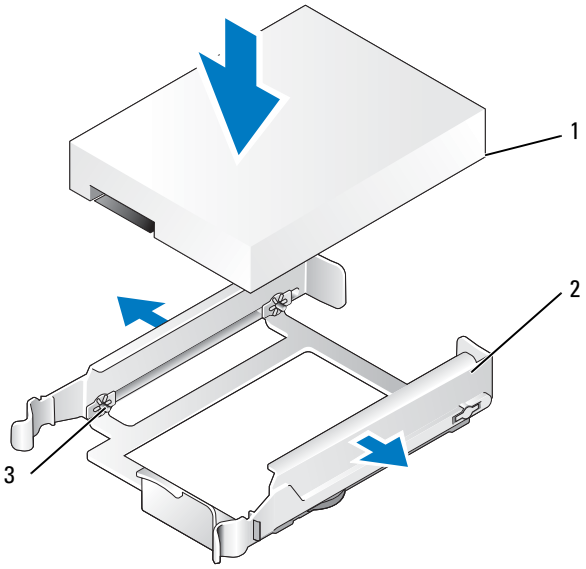
Installing a Hard Drive

1. Unpack the replacement hard drive, and prepare it for installation.
2. Check the documentation for the drive to verify that it is configured for your computer.
3. If your replacement hard drive does not have the plastic hard drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.



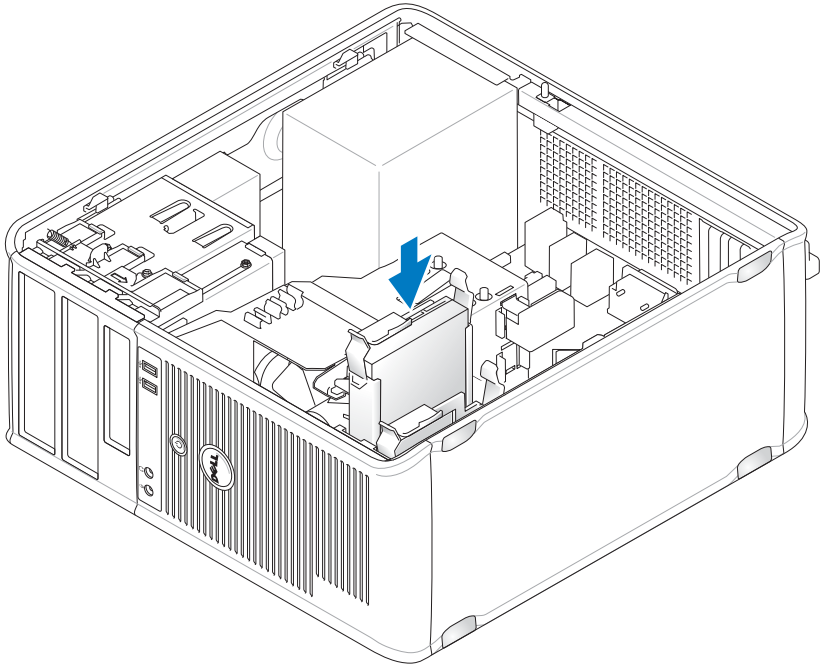
1 hard drive 2 hard drive bracket

4 Snap the bracket onto the new drive.



1 hard drive 2 hard drive bracket 3 pins

5 Gently spread the sides of the drive bracket and slide the hard drive into the bracket, aligning the drive with the bracket pins, until the drive clicks into place.



6 Carefully slide the hard drive into the drive bay until it clicks into place.

7 Connect the power and data cables to the drive.

8 Ensure that the data cable is securely connected to the connector on the system board.

NOTICE: Always connect the data cable to the SATA0 connector on the system board, or to the SATA1 connector if you already have a hard drive connected to the SATA0 connector and you are installing a second hard drive.

9 Check all connectors to be certain that they are properly cabled and firmly seated.

10 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

11 Insert bootable media and enter system setup (see "System Setup" on page 280), and update the SATA port option under the Drives option list.

12 Exit system setup, and reboot the computer.

13 Partition and logically format your drive.

See the documentation for your operating system for instructions.

14 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

15 If the drive you just installed is the primary drive, install your operating system on the hard drive. If the drive you just installed is the primary drive, insert a bootable medium into your boot drive. See the documentation that came with the drive for instructions on installing any software required for drive operation.

Adding a Second Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

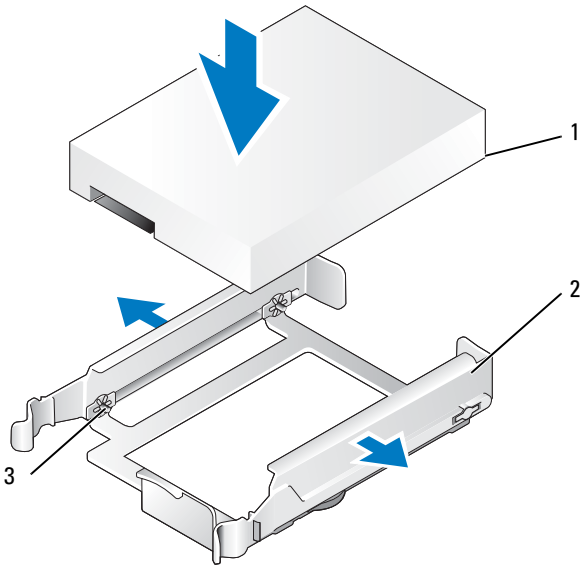
1 Check the documentation for the drive to verify that it is configured for your computer.

2 Follow the procedures in "Before You Begin" on page 21.

3 Remove the computer cover (see "Removing the Computer Cover" on page 27).

4 Remove the plastic hard drive bracket from the inside of the hard drive bay by squeezing the release tabs and gently pulling the bracket up and out of the bay.

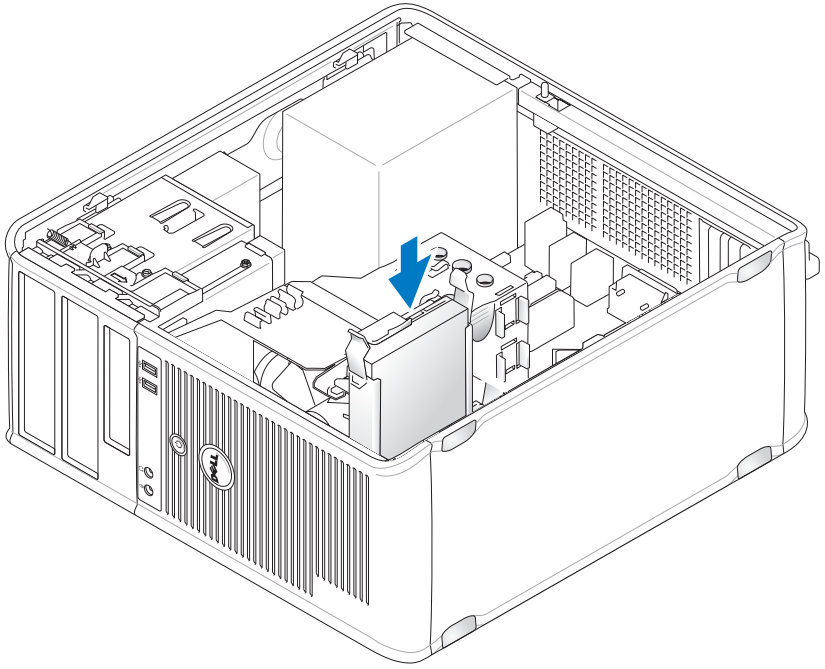
5 Gently spread the sides of the drive bracket and slide the hard drive into the bracket, aligning the drive with the bracket pins, until the drive clicks into place.



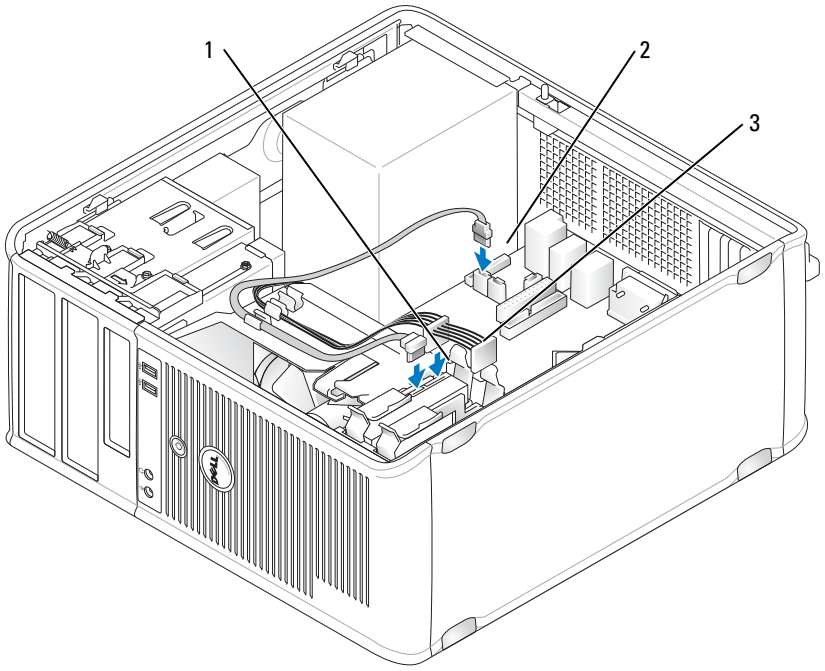
1 hard drive 2 hard drive bracket 3 pins

6 Carefully slide the new hard drive into the bay until it clicks into place.

7 Connect the power cable to the drive.



8 Locate an unused SATA connector on the system board and attach a data cable to this connector and to the second hard drive.



1	data cable	2	hard drive system board connector	3	power cable

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

10 Enter system setup (see "System Setup" on page 280), and update the SATA port option under the Drives option list.

11 Exit system setup, and reboot the computer.

12 Partition and logically format your drive.

See the documentation for your operating system for instructions.

13 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

14 If the drive you just installed is the primary drive, install your operating system on the hard drive.

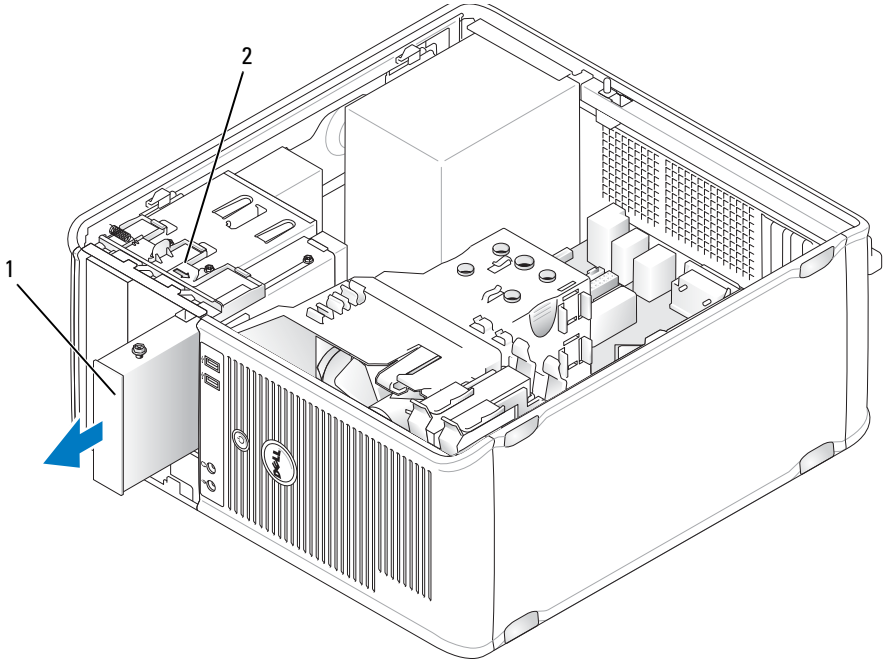
Floppy Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing the Floppy Drive

1. Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the **Diskette Drive** option to disable the floppy drive.
2. Follow the procedures in "Before You Begin" on page 21.
3. Remove the computer cover (see "Removing the Computer Cover" on page 27).
4. Remove the drive panel by sliding the drive release latch downward to open the panel, and then remove it from the hinges.
5. Disconnect the power and data cables from the back of the floppy drive.

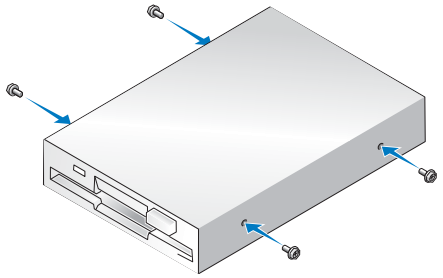


1 floppy drive 2 drive release latch

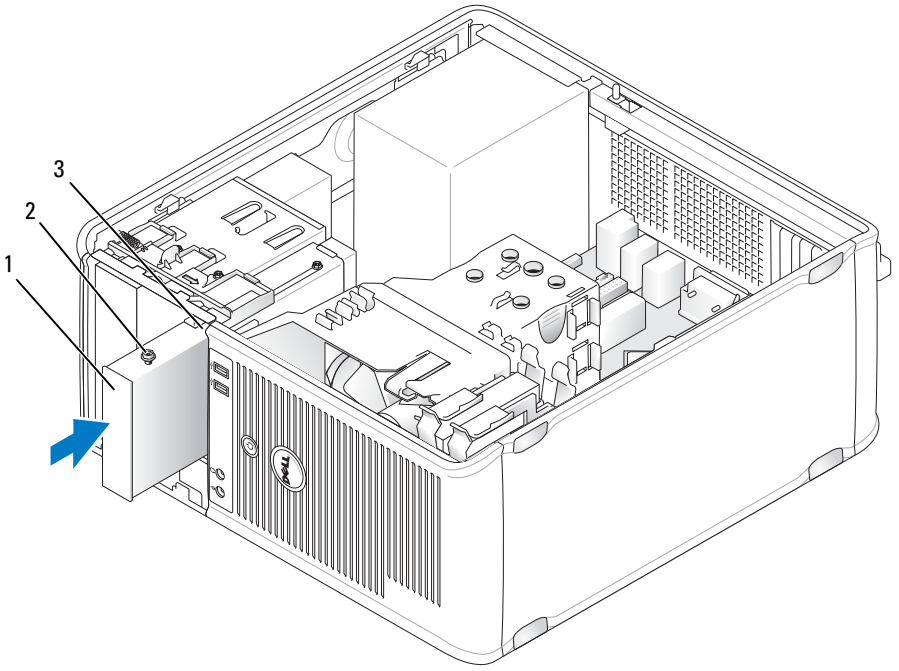
6. Grasp the sliding plate lever and slide it towards the bottom of the computer until the drive panel snaps open; while holding the lever in place, slide the drive out of the computer.

Installing the Floppy Drive

1. If you are replacing a floppy drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.
2. If you are installing a new floppy drive, remove the drive-panel insert for the 3.5-inch drive bay, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.

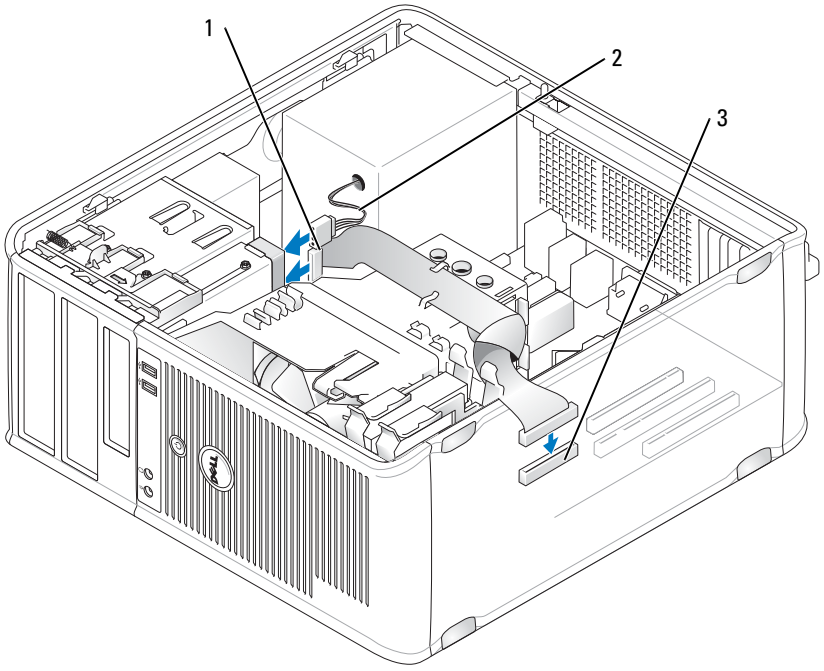


3 Align the shoulder screws on the floppy drive with the shoulder screw slots, and gently slide it into the bay until it clicks into place.



1 floppy drive 2 shoulder screws (4) 3 shoulder screw slots (2)

4 Attach the power and data cables to the floppy drive and to the system board.



1 data cable 2 power cable 3 floppy drive connector (DSKT)

5 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

6 Enter system setup (see "Entering System Setup" on page 280), and use the **Diskette Drive** option to enable your new floppy drive.

7 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Media Card Reader

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

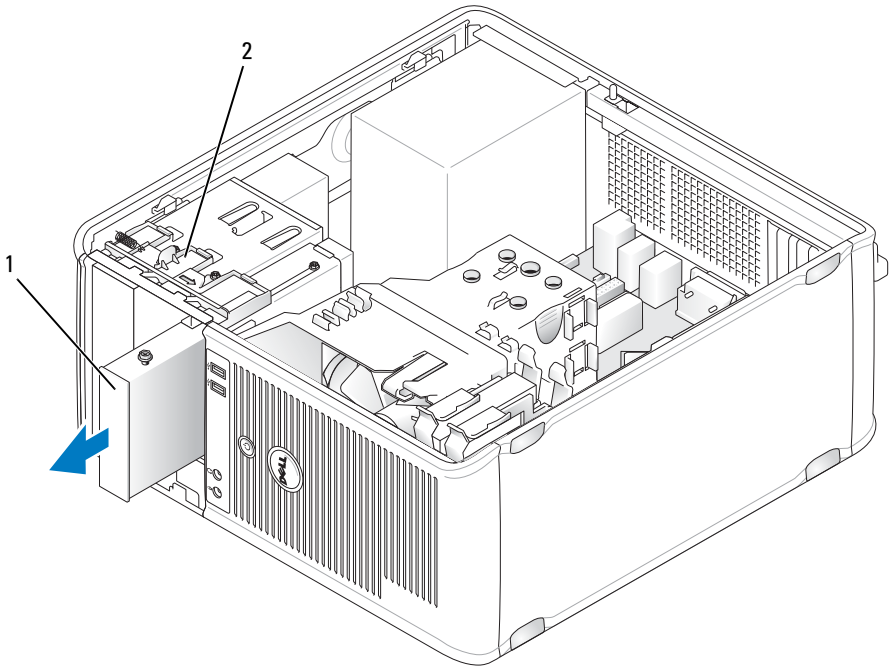
Removing the Media Card Reader

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

3 Remove the drive panel by sliding the drive release latch downward to open the panel, and then remove it from the hinges.

4 Disconnect the cable from the back of the media card reader.



1 media card reader 2 drive release latch

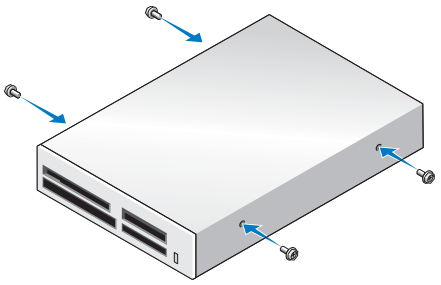
5 Grasp the sliding plate lever and slide it towards the bottom of the computer until the drive panel snaps open; while holding the lever in place, slide the media card reader out of the computer.

Installing the Media Card Reader

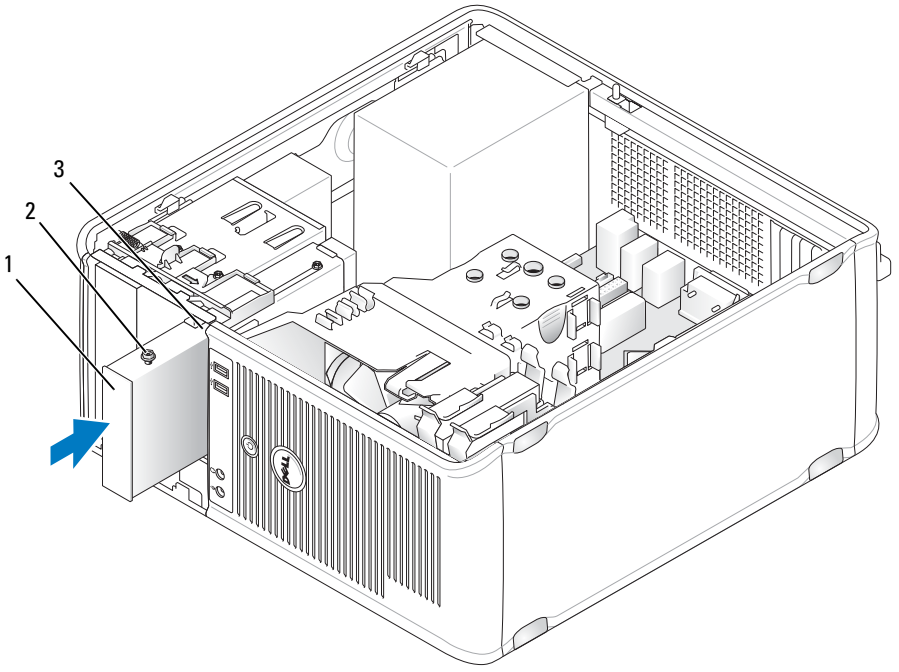
1 If you are replacing a media card reader, remove the shoulder screws from the existing drive and attach the screws to the replacement media card reader.

NOTE: If you are replacing an existing floppy drive with a media card reader, ensure you disable the floppy before installing the media card reader. Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the **Diskette Drive** option to disable the floppy drive. Follow instructions in "Removing the Floppy Drive" on page 64.

2 If you are installing a new media card reader, remove the drive-panel insert for the 3.5-inch drive bay, remove the shoulder screws from the inside of the drive-panel insert and attach the screws to the new drive.

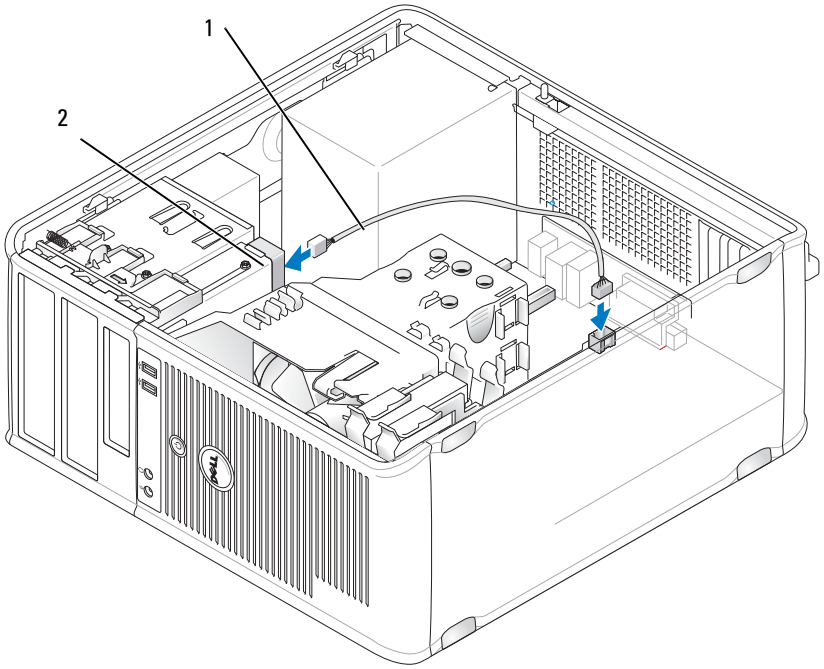


3 Align the shoulder screws on the media card reader with the shoulder screw slots, and gently slide it into the bay until it clicks into place.



1 media card reader
2 shoulder screws (4)
3 shoulder screw slots (2)

4 Attach the cable to the media card reader and to the system board.



1 data/power cable 2 media card reader

5 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

6 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Optical Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before replacing the cover.

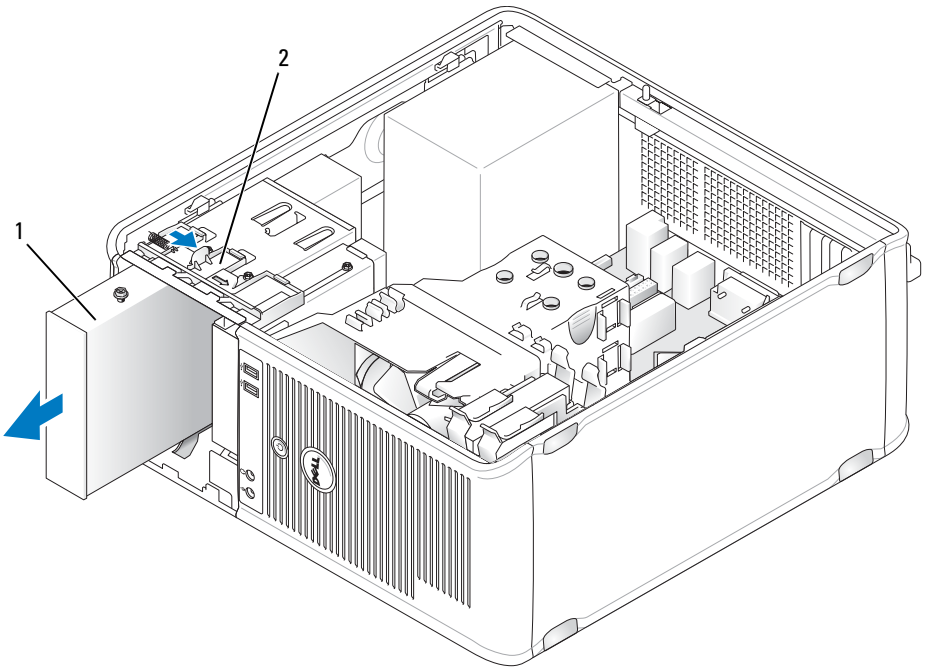
Removing an Optical Drive

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

3 Disconnect the power and data cables from the back of the drive.

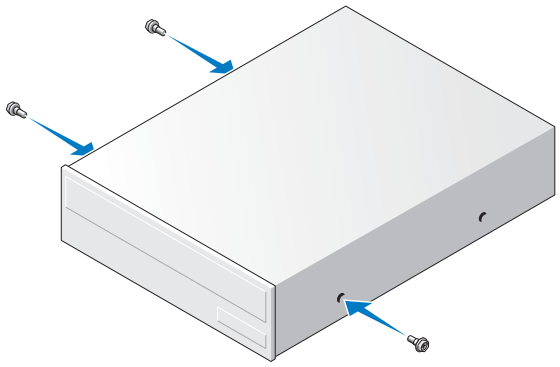
4 Grasp the sliding plate lever and slide it towards the bottom of the computer until the drive panel snaps open; while holding the lever in place, slide the drive out of the computer.



1 optical drive 2 drive release latch

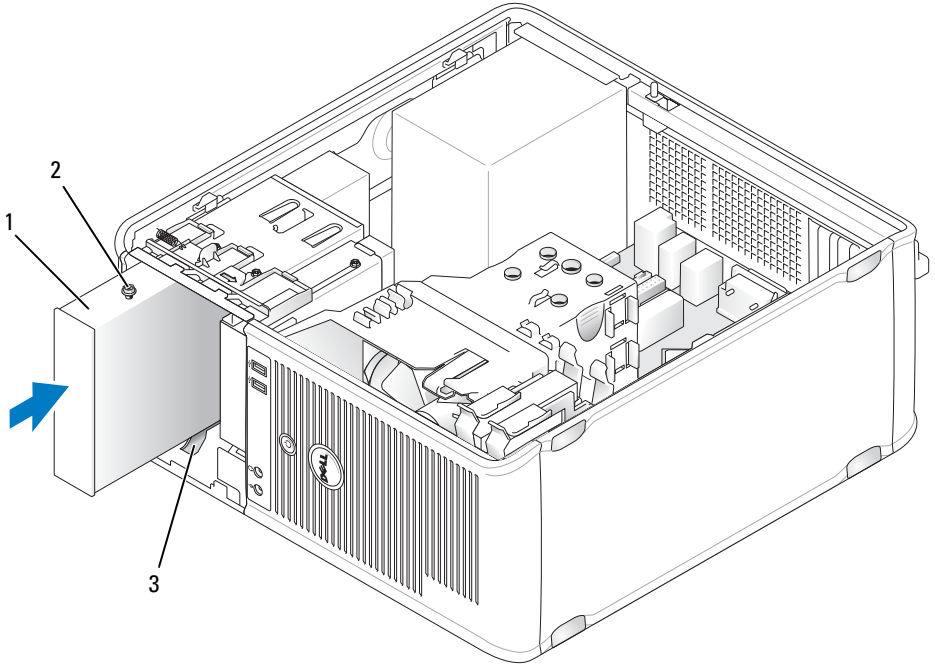
Installing an Optical Drive

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).
3. If you are replacing an optical drive, remove the shoulder screws from the existing drive and attach the screws to the replacement drive.
4. If you are installing a new optical drive, remove the drive-panel insert, remove the shoulder screws from the inside of the drive-panel insert, and attach the screws to the new drive.



5 Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

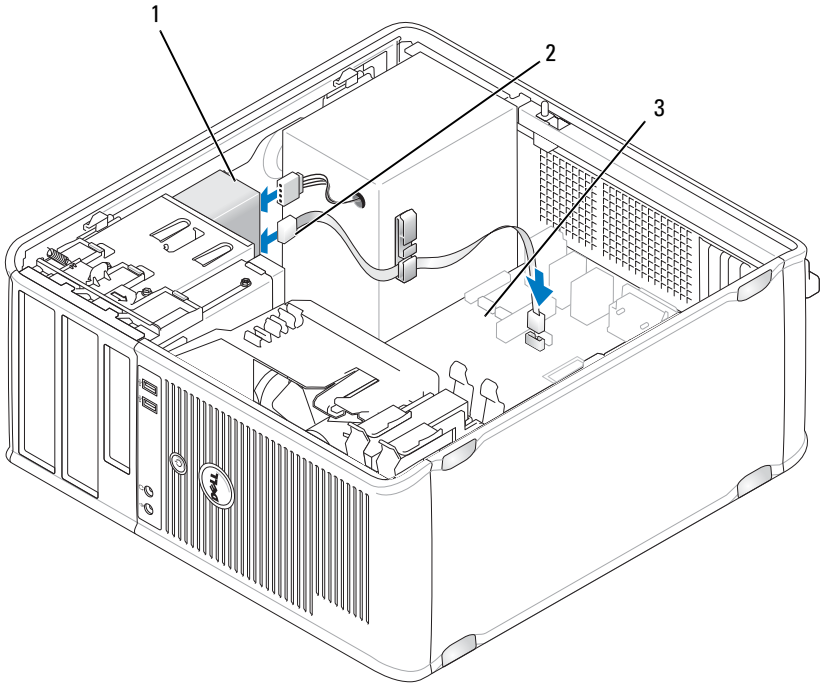
6 Align the shoulder screws on the optical drive with the shoulder screw slots, and slide the drive into the bay until it clicks into place.



1 optical drive 2 shoulder screws (3) 3 shoulder screw slots (2)

7 Connect the power and data cables to the drive and to the system board.

NOTICE: Always connect the optical drive SATA cable to a system board SATA connector that is labeled with a number higher than those connected to any hard drives installed in the computer.



1 power cable 2 data cable 3 SATA optical drive connector

8 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

10 Update your configuration information in system setup by setting the appropriate **Drive** option (SATA-1, SATA-2, or SATA-3) under **Drives**. See "System Setup" on page 280.

11 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Processor

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

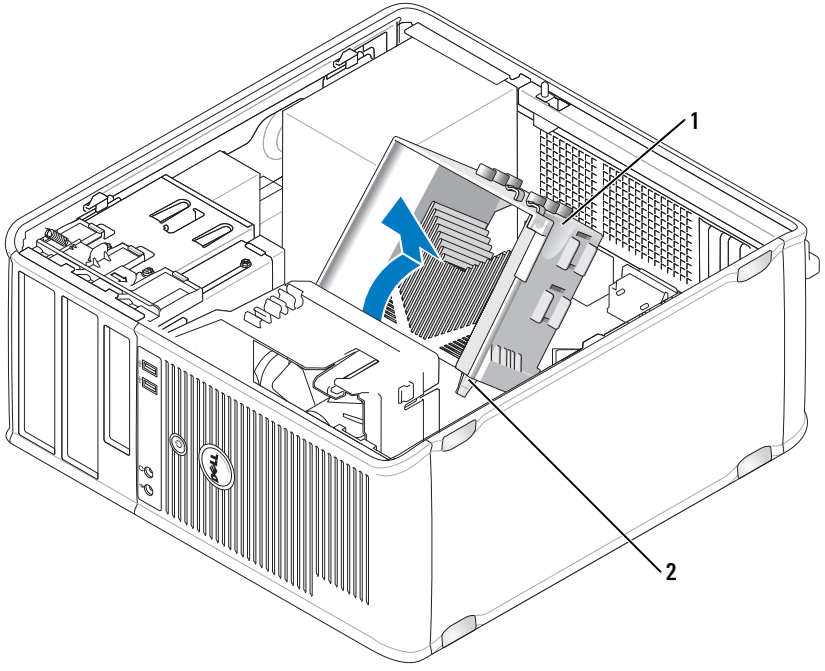
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).
3. Move any cables routed over the heat sink assembly.
4. Loosen the captive screw (shown in the following figure) on each side of the heat sink assembly.

CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

5. Rotate the heat sink assembly upward, and remove it from the computer.
   Lay the heat sink down on its top, with the thermal grease facing upward.

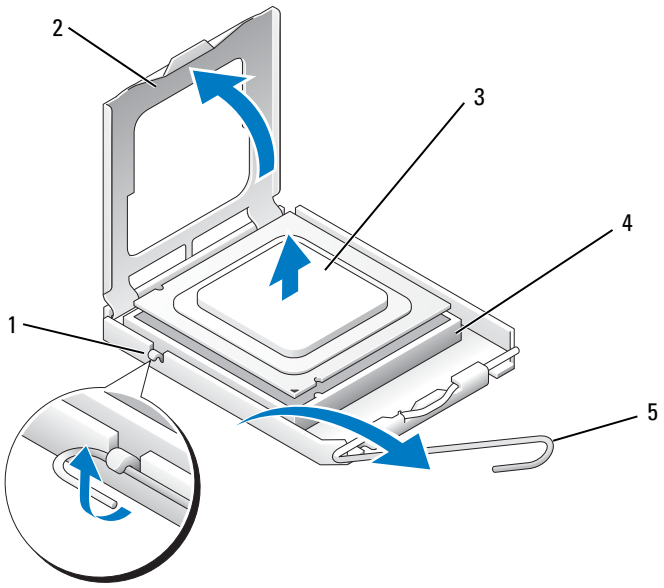


1 heat sink assembly 2 captive screw housings (2)

NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

6 Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then, pull the lever back to release the processor.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.



1	center cover latch	2	processor cover	3	processor
4	socket	5	release lever		

7 Gently remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor.

Installing the Processor

NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 27).

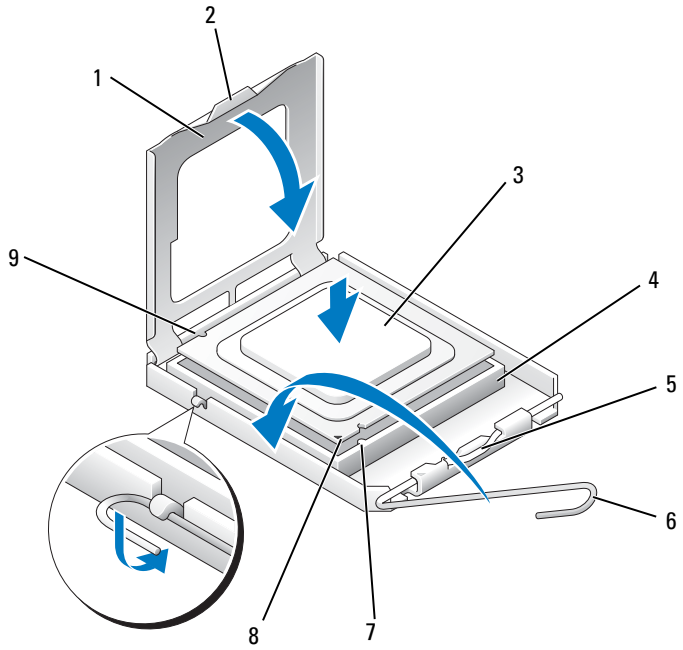
3 Unpack the new processor, being careful not to touch the underside of the processor.

NOTE: You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

4 If the release lever on the socket is not fully extended, move it to that position.

5 Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

6 Align the pin-1 corners of the processor and socket.



1	processor cover	2	tab	3	processor
4	processor socket	5	center cover latch	6	release lever
7	front alignment-notch	8	socket and processor pin-1 indicator	9	rear alignment-notch

NOTICE: To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

7 Set the processor lightly in the socket and ensure that the processor is positioned correctly.

8 When the processor is fully seated in the socket, close the processor cover.

Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

9 Pivot the socket release lever back toward the socket, and snap it into place to secure the processor.

10 Clean the thermal grease from the bottom of the heat sink.

NOTICE: Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

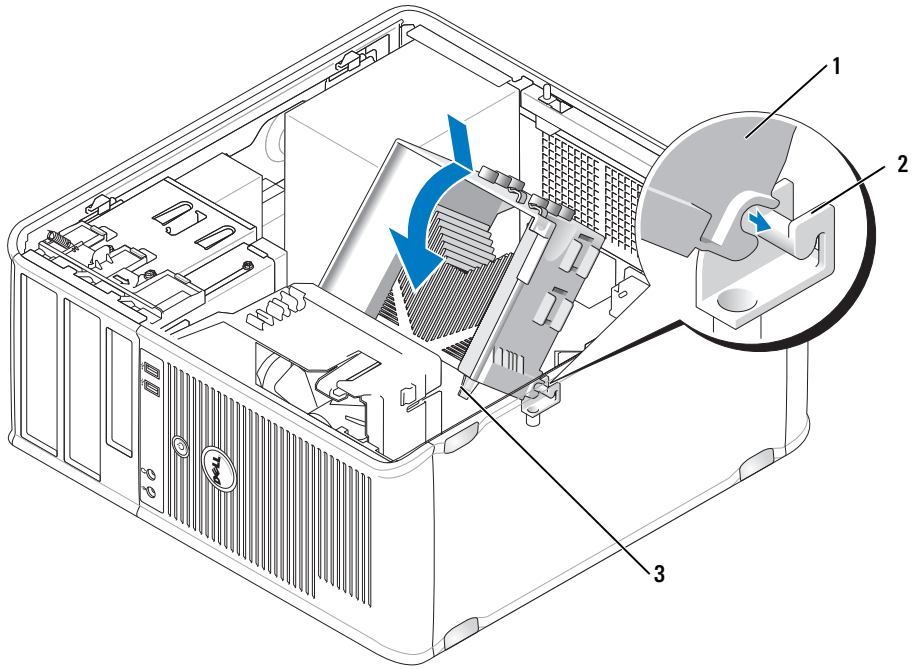
11 Apply the new thermal grease to the top of the processor.

12 Install the heat sink assembly:

a Place the heat sink assembly back onto the heat-sink assembly bracket.

b Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

NOTICE: Ensure that the heat sink assembly is correctly seated and secure.



1 heat sink assembly 2 heat-sink assembly bracket 3 captive screw housing (2)

13 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

I/O Panel

Removing the I/O Panel

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

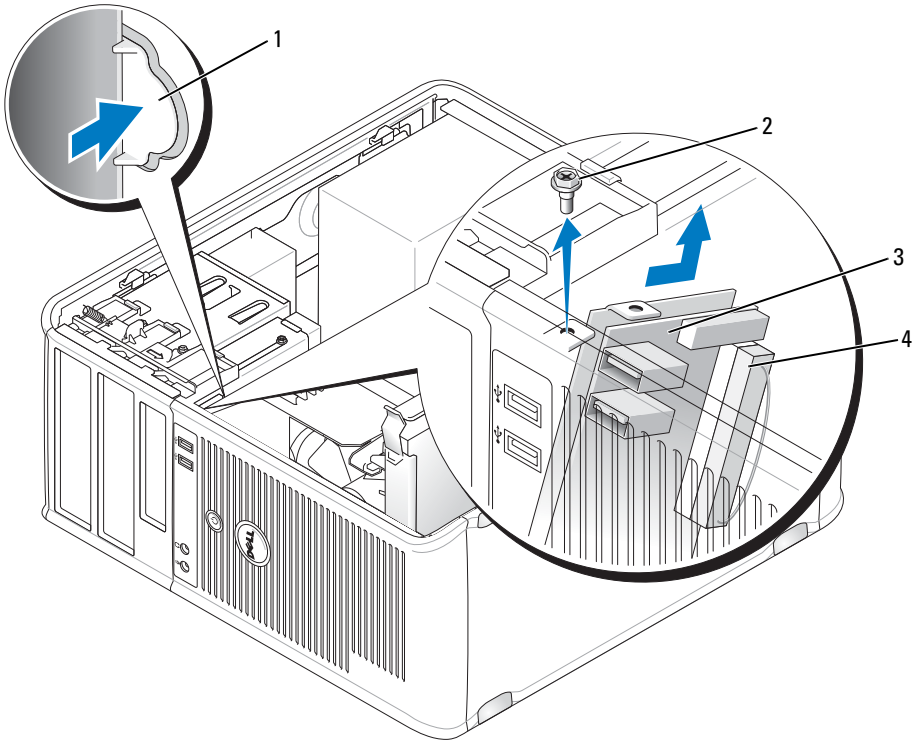
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTE: Note the routing of all cables as you remove them so that you can re-route them correctly when installing the new I/O panel.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).

NOTICE: When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

3. Remove the screw that secures the I/O panel. Press the release button to slide the card away from the front of the computer.
4. Disconnect all of the cables from the I/O panel, and remove the panel from the computer.



1	I/O panel release button	2	securing screw
3	I/O panel	4	I/O cable connector

Replacing the I/O Panel

1 To replace the I/O panel, follow the removal procedure in the reverse order.

NOTE: Use the guides on the I/O panel bracket to help position the I/O panel in place, and use the notch on the I/O panel bracket to help seat the panel.

Power Supply

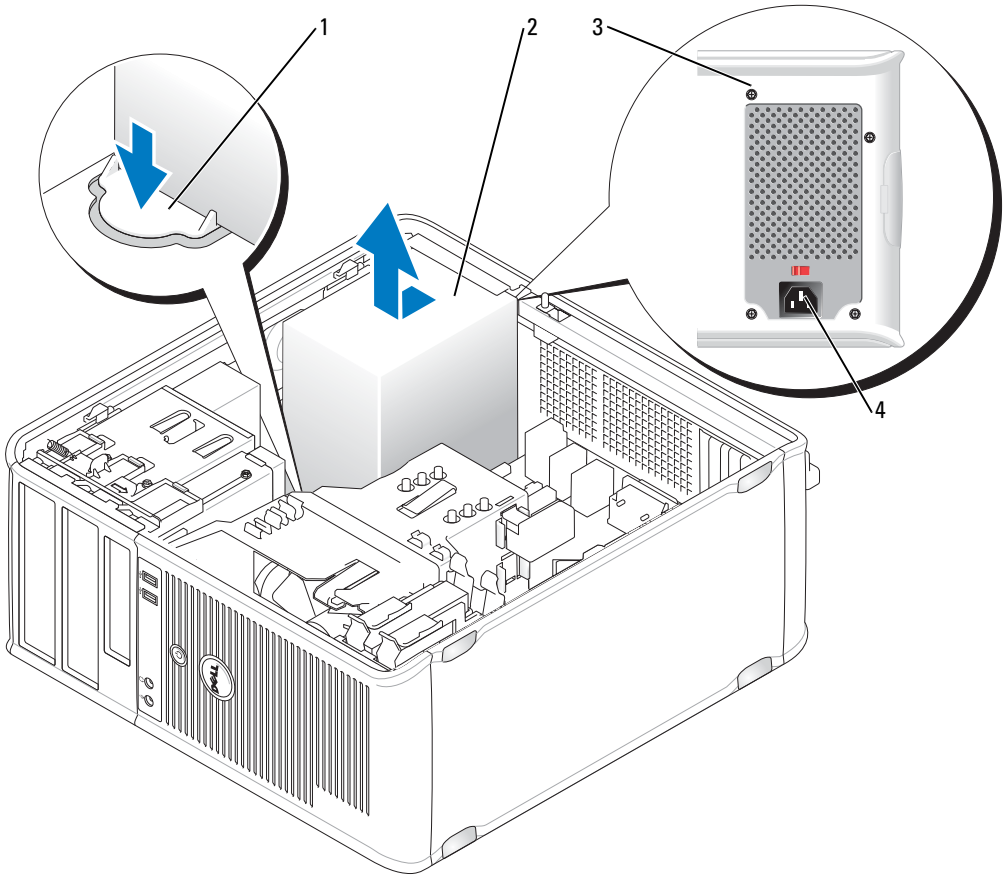
Replacing the Power Supply

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 27).
3. Disconnect the DC power cables from the system board and the drives.

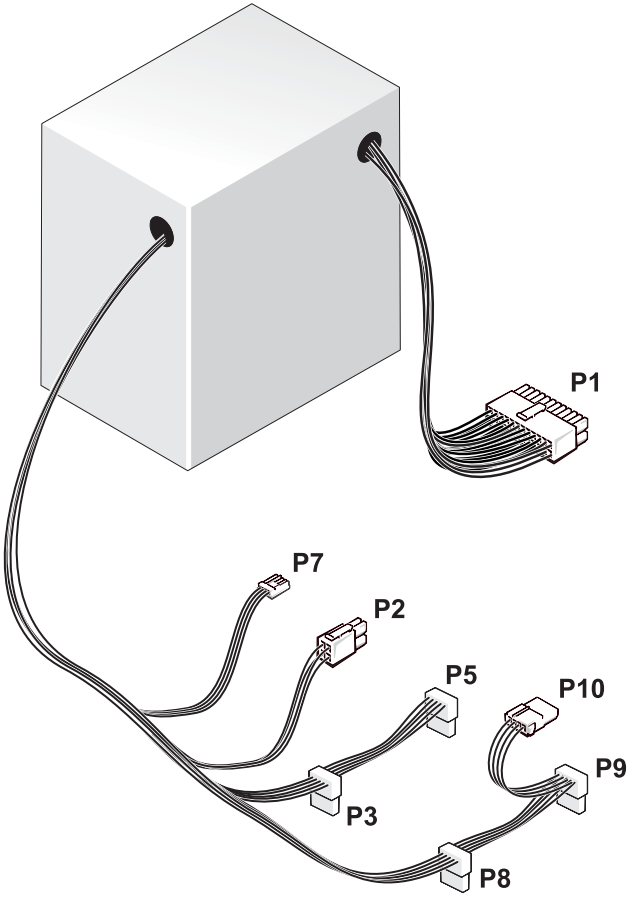
   Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.
4. Remove the four screws that attach the power supply to the back of the computer chassis.
5. Press the release button located on the floor of the computer chassis.



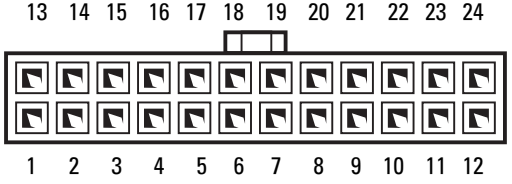
1	release button	2	power supply
3	screws (4)	4	AC power connector

6. Slide the power supply toward the front of the computer by approximately 1 inch.
7. Lift the power supply up and out of the computer.
8. Slide the replacement power supply into place.
9. Replace the screws that secure the power supply to the back of the computer chassis.
10. Reconnect the DC power cables to the power supply.
11. Connect the AC power cable to the AC power connector.
12. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

DC Power Connectors



DC Power Connector P1



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black

Pin Number	Signal name	18-AWG Wire
4	+5 VDC	Red
5	GND	Black
6	+5 VDC	Red
7	GND	Black
8	PS_PWRGOOD	Gray
9	P5AUX	Purple
10	V_12P0_DIG	White
11	V_12P0_DIG	White
12	+3.3 VDC	Orange
13	+3.3VDC/SE*	Orange
14	-12 VDC	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	+5 VDC	Red
22	+5 VDC	Red

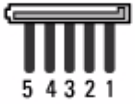
Pin Number	Signal name	18-AWG Wire
23	+5 VDC	Red
24	GND	Black

*Optional wire. Use 22-AWG wire instead of 18-AWG wire.

DC Power Connector P2

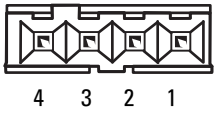
Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VADC	Yellow
4	+12 VADC	Yellow

DC Power Connectors P3, P5, P8, and P9



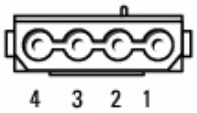
Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red
4	GND	Black
5	+12 VBDC	White

DC Power Connector P7



Pin Number	Signal Name	22-AWG Wire
1	+5 VDC	Red
2	GND	Black
3	GND	Black
4	+12 VDC	Yellow

DC Power Connector P10



Pin Number	Signal name	18-AWG Wire
1	+12 VBDC	White
2	GND	Black
3	GND	Black
4	+5 VDC	Red

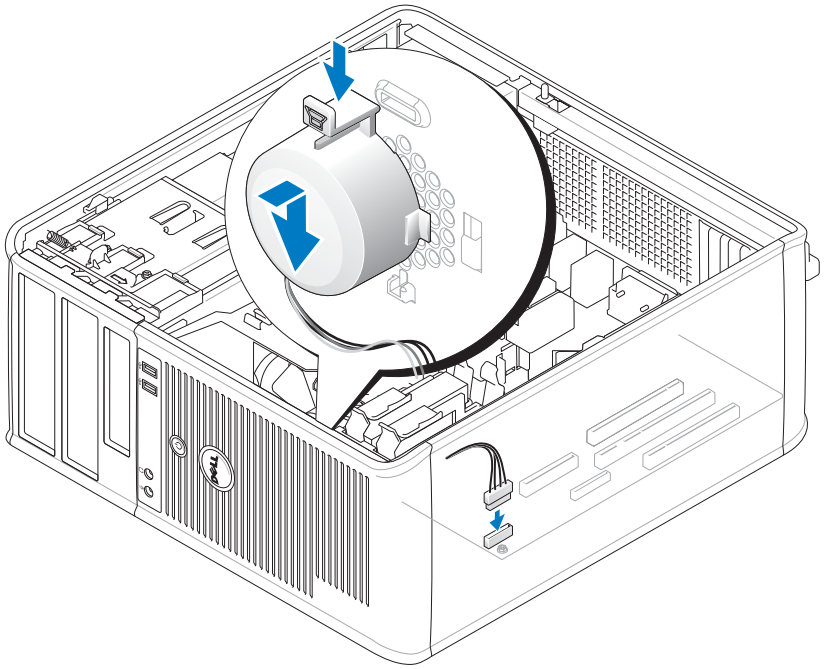
Speakers

Installing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 27).
3. Insert the speaker into the chassis of the computer.



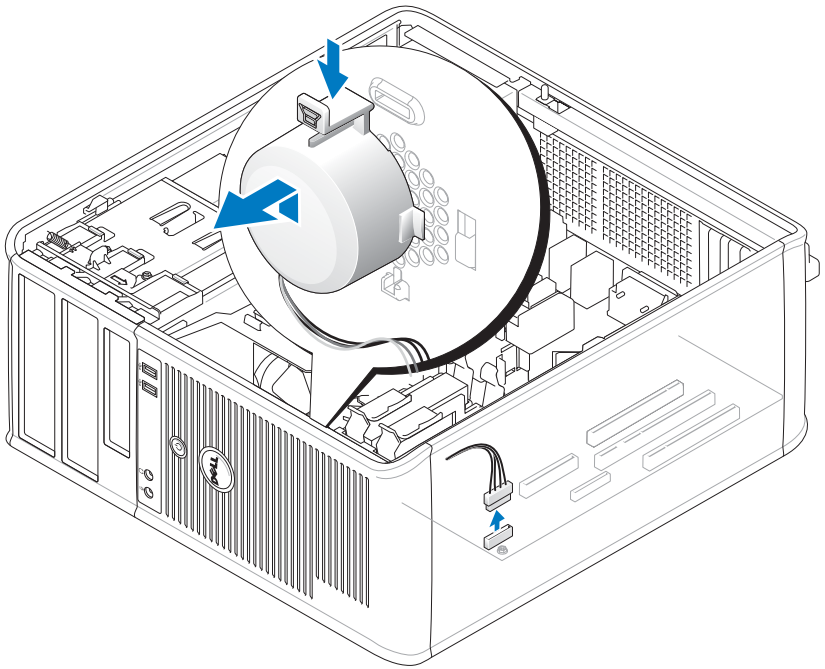
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 27).
3. Disconnect the cables from the system board.
4. Remove the speaker from the chassis of the computer.

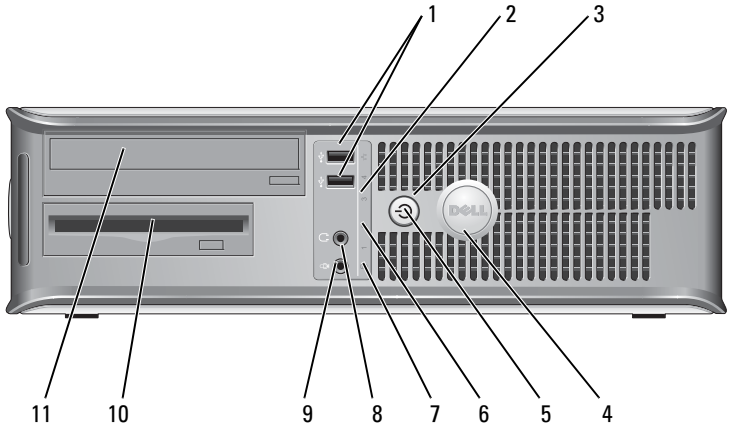


5. Replace the computer cover.
6. Turn on power to the computer.

Desktop Computer

About Your Desktop Computer

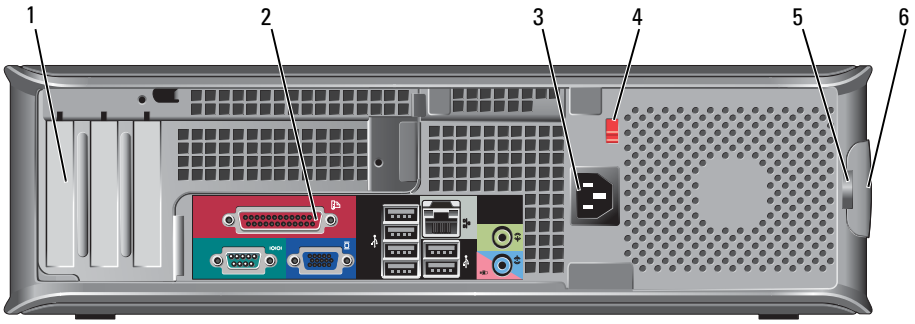
Front View



1	USB 2.0 connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 280 for more information about booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
2	LAN indicator light	This light indicates that a LAN (local area network) connection is established.
3	power button	Press this button to turn on the computer. **NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 21 for more information. **NOTICE:** If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.
4	Dell badge	This badge can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge.

5	power light	The power light illuminates and blinks or remains solid to indicate different operating states: • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — See "Power Problems" on page 339. To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management for Windows XP and Windows Vista" on page 292. See "Diagnostic Lights" on page 347 for a description of light codes that can help you troubleshoot problems with your computer.
6	diagnostic lights	Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 347.
7	hard drive activity light	This light flickers when the hard drive is being accessed.
8	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
9	microphone connector	Use the microphone connector to attach a microphone.
10	3.5-inch drive bay	Can contain an optional floppy drive, second hard drive, or optional media card reader.
11	5.25-inch drive bay	Can contain an optical drive. Insert a CD or DVD (if supported) into this drive.

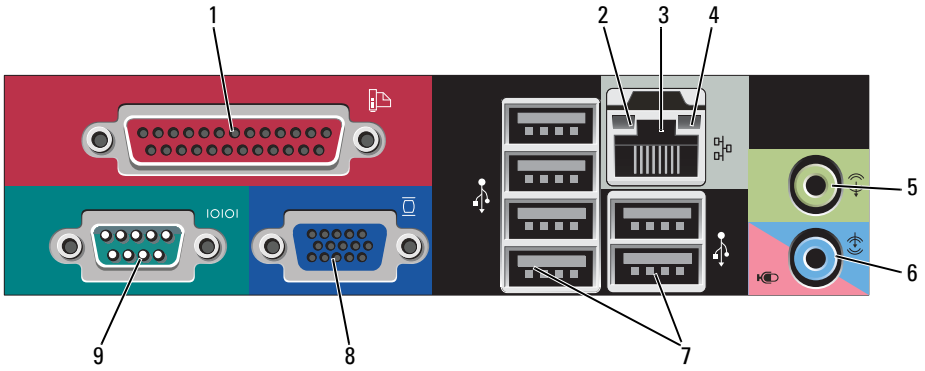
Back View



1	card slots	Access connectors for any installed PCI or PCI Express cards, PS/2 connector, eSATA connector, etc. **NOTE:** The back view of the computer is different if a riser is installed.
2	back panel connectors	Plug serial, USB, and other devices into the appropriate connectors (see "Back Panel Connectors" on page 89).
3	power connector	Insert the power cable.

4	voltage selection switch	Your computer is equipped with a manual voltage selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location. **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position. Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.
5	padlock ring	Insert a padlock to lock the computer cover.
6	cover-release latch	Allows you to open the computer cover.

Back Panel Connectors



1	parallel connector	Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. **NOTE:** The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 281.
2	link integrity light	• Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer. • Off — The computer is not detecting a physical connection to the network.

3	network adapter connector	To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **NOTE:** Do not plug a telephone cable into the network connector. For VPro to work, the network cable must be connected to the onboard NIC. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
4	network activity light	Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
5	line-out connector	Use the green line-out connector to attach headphones and most speakers with integrated amplifiers.
6	line-in/microphone connector	Use the blue and pink line-in/microphone connector to attach a record/playback device such as a cassette player, CD player, or VCR.; or a personal computer microphone for voice or musical input into a sound or telephony program.
7	USB 2.0 connectors (6)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
8	video connector	Plug the cable from your VGA-compatible monitor into the blue connector. **NOTE:** If you purchased an optional graphics card, this connector will be covered by a cap. Connect your monitor to the connector on the graphics card. Do not remove the cap. **NOTE:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.
9	serial connector	Connect a serial device, such as a handheld device, to the serial port. The default designations are COM1 for serial connector 1 and COM2 for serial connector 2. For more information, see "System Setup Options" on page 281.

Removing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

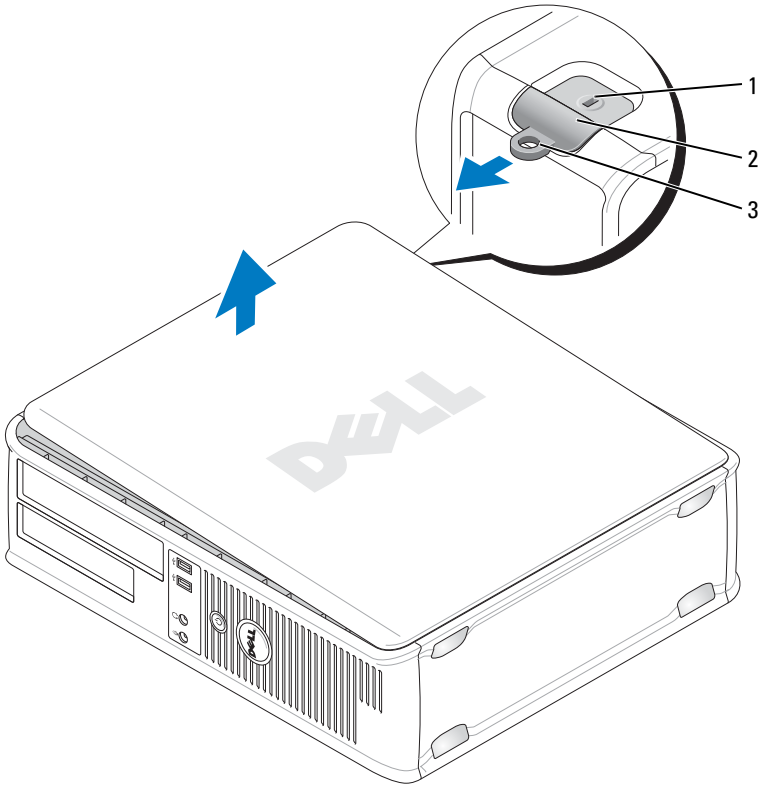
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in "Before You Begin" on page 21.
2. If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.

4 Grip the sides of the computer cover and pivot the cover up using the hinge tabs as leverage points.

5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.



1 security cable slot

2 cover release latch

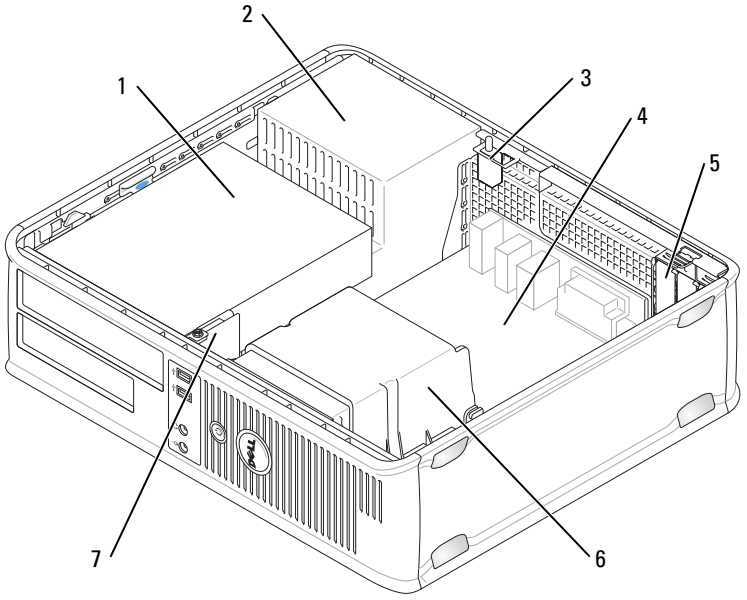
3 padlock ring

Inside Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



1	drive bays (media card reader or floppy drive, optical drive and hard drive)	5	card slots
2	power supply	6	heat sink assembly
3	optional chassis-intrusion switch	7	front I/O panel
4	system board		

Chassis Intrusion Switch

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop, and small form factor computers; it may not be present on your computer.

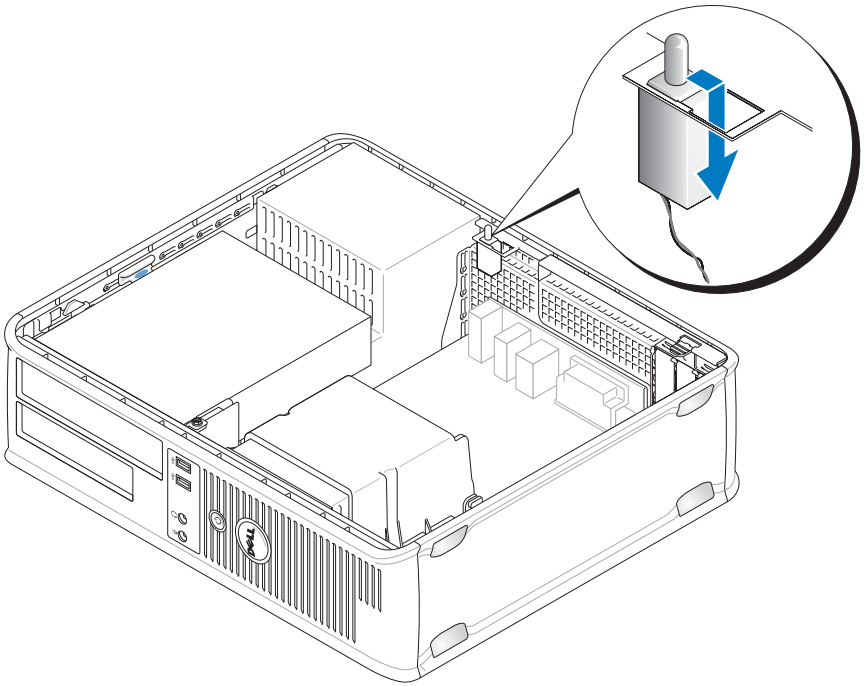
Removing the Chassis Intrusion Switch

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

4 Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

NOTE: You may feel a slight resistance as you slide the switch out of the slot.



Replacing the Chassis Intrusion Switch

1 Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until it snaps securely into place.

2 Reconnect the cable to the system board.

3 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Resetting the Chassis Intrusion Detector

1 Turn on (or restart) your computer.

2 When the blue DELL™ logo appears, press <F2> immediately.

If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3 Select the **Chassis Intrusion** option and then press the left- or right-arrow key to select **Reset**. Change the setting to **On**, **On-Silent**, or **Disabled**.

NOTE: The default setting is **On-Silent**.

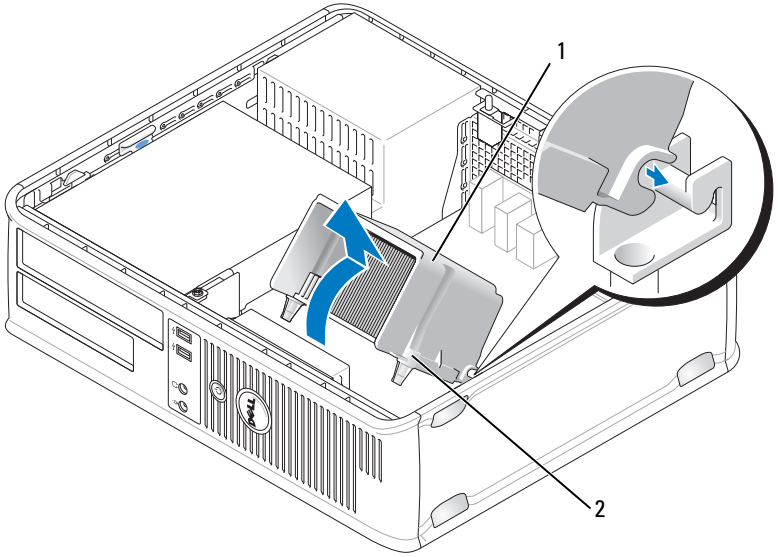
4 Save your BIOS settings and exit system setup.

Removing the Heat Sink Assembly

1 Loosen the captive screw on each side of the heat sink assembly.

CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

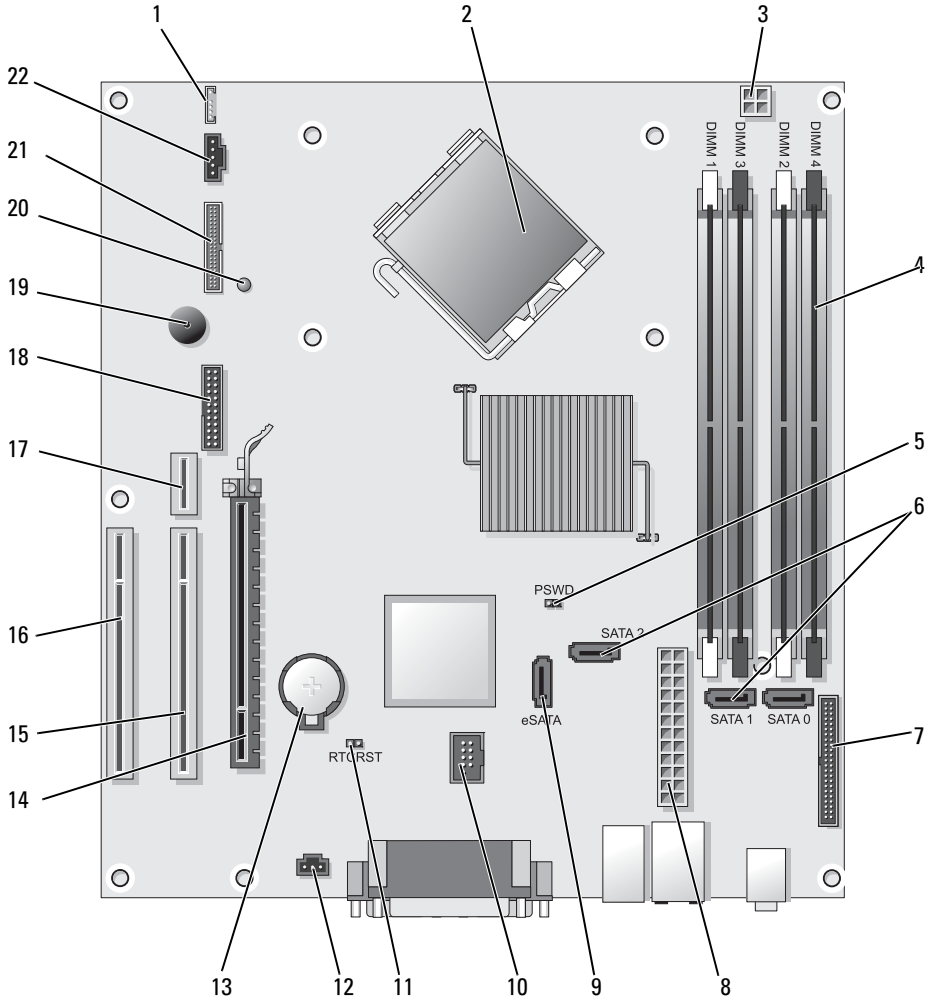
2 Rotate the heat sink assembly upward, and remove the assembly from the computer. Lay the heat sink down on its top.



1 heat sink assembly

2 captive screw housing (2)

System Board Components



1 internal speaker (INT_SPKR)

2 processor connector (CPU)

3 processor power connector (12VPOWER)

4 memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)

5 password jumper (PSWD)

6 SATA connectors (SATA0, SATA1, SATA2)

7 front-panel connector (FRONTPANEL)

8 power connector (POWER)

9 external SATA connector (eSATA)

10 internal USB (INT_USB)

11 RTC reset jumper (RTCRST)

12 intrusion switch connector (INTRUDER)

13 battery socket (BATTERY)

14 PCI Express x16 connector (SLOT1)

15 PCI connector (SLOT2)

16 PCI connector (SLOT3)

17 riser connector (uses PCI-E port/SLOT1 and PCI port/SLOT2)

18 serial connector (SERIAL2)

19 system board speaker (BEEP)

20 aux power LED (aux_LED)

21 floppy connector (DSKT)

22 fan connector (FAN_CPU)

Desktop Computer Specifications

Microprocessor	
Microprocessor type	The following are supported: • Intel® Core™2 • Intel vPro™ • Intel Celeron®
Internal cache	L1: up to 128 KB; L2: up to 8 MB (depending on your processor)

Memory	
Type	667-MHz or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 1 GB; single-channel: 512 MB **NOTE:** 512 MB is the minimum shipping configuration.
Maximum memory	64-bit operating system: 8 GB 32-bit operating system: 4 GB
BIOS address	F0000h

Computer Information	
Chipset	Intel Q35 Express Chipset w/ICH9DO
Data bus width	64 bits
Address bus width	32 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	32 Mb
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication iAMT 3.0

Video	
Type	• Intel Graphics Media Accelerator 3100 (integrated on system board) • PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)
Audio	
Type	ADI 1984 High Definition Audio
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog
Controllers	
Drives	three SATA controllers and one eSATA controller supporting one device each
Expansion Bus	
Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
Bus speed	PCI: 133 MB/s PCI Express x16: 8 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps
Cards	standard configuration supports low-profile cards only; with optional riser-card cage, computer supports half-length, full-height cards. Full-height cards are supported in the 6.875-inch riser card cage.
PCI: without riser-card cage	
connectors	two
card size	low profile
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express: without riser-card cage	
connectors	one x16
card size	low profile
power	25 W (maximum)

Expansion Bus	
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)
PCI and PCI Express: with optional, full-height PCI Express riser-card cage, supporting both low-profile and full-height cards	
PCI	
connectors	two
card size	one low-profile card and one full-height card
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express	
connectors	one x16
card size	full-height
power	25 W maximum
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)
PCI only: with optional, full-height PCI riser-card cage, supporting both low-profile and full-height cards	
connectors	three PCI
card size	one low-profile card and two full-height cards
connector size	120 pins
connector data width (maximum)	32 bits
eSATA	

Drives	
Externally accessible	one One eSATA drive (optional)
Internally accessible	• two SATA (Serial ATA) hard drives • one3.5-inch floppy drive or media card reader • one SATA optical drive

Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Video	15-pin VGA connector
Network adapter	RJ45 connector
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs
USB	two front-panel and six back panel USB 2.0–compliant connectors
Audio	two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	three 7-pin connectors
eSATA	one 7-pin connector
Internal USB	10-pin header for optional media card reader (in 3.5-inch drive bay)
Floppy drive	34-pin connector
Serial	12-pin connector for optional secondary PS/2 serial port card
Fan	5-pin connector
PCI Express	one 120-pin (x16) connector
PCI 2.3	two 120-pin connectors
Front panel	40-pin connector

Key Combinations	
<Ctrl><Alt><Del>	in Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during system start-up only)
<F3>	automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup **Boot Sequence** option (during system start-up only)
<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard drive and system diagnostics
<Ctrl><p>	displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

Controls and Lights	
Power control	push button
Power light	green light — blinking green indicates a sleep mode; solid green indicates a power-on state. amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See "Power Problems" on page 339.)
hard drive access light	green
Link light	solid green light indicates network connection
Link integrity light (on integrated network adapter)	green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	yellow blinking light
Diagnostic lights	four lights on the front panel (See "Diagnostic Lights" on page 347.)
Standby power light	AUX_PWR on the system board

Power	
DC power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source, but the internal battery does draw a minute amount of power from the power supply even when the computer is not drawing power from the AC power source.
Wattage	280 W

Power *(continued)*	
Heat dissipation	955 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
Voltage	manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	11.4 cm (4.5 inches)
Width	39.9 cm (15.7 inches)
Depth	35.3 cm (13.9 inches)
Weight	10.4 kg (23 lb)

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	–15.2 to 3048 m (–50 to 10,000 ft)
Storage	–15.2 to 10,668 m (–50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

Cards

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

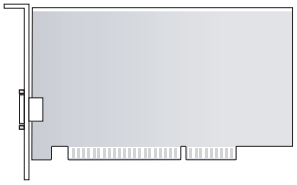
NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintains the airflow that cools your computer.

Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors on the system board for PCI and PCI Express cards:

- Two connectors for low-profile PCI cards
- One connector for a low-profile PCI Express x16 card

NOTE: Your Dell computer includes only PCI and PCI Express card connectors. ISA cards are not supported.

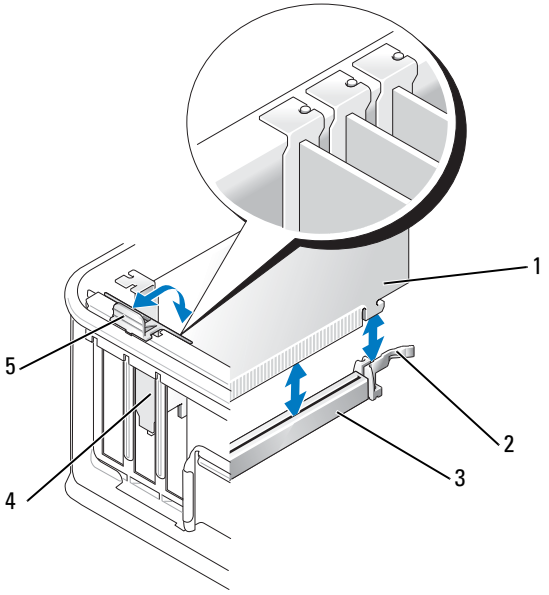
PCI Cards



Installing a PCI Card

If you are replacing a PCI card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).
3. Gently press the release tab on the card-retention latch all the way up.



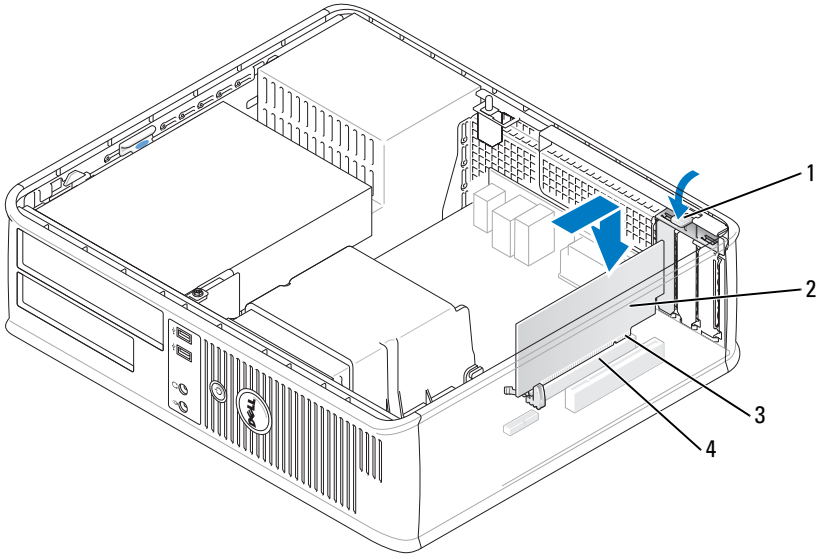
1	card	4	card insert
2	card-retention latch	5	release tab
3	system board connector		

4 If you are installing a card in an empty card connector on the system board, remove the filler bracket to create a card-slot opening at the back of the computer. Then continue with step 6.

5 If you are installing a card to replace one already installed in the computer, remove the installed card (see "Removing a PCI Card" on page 109).

6 Prepare the card for installation.

NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.



1 release tab on card-retention latch

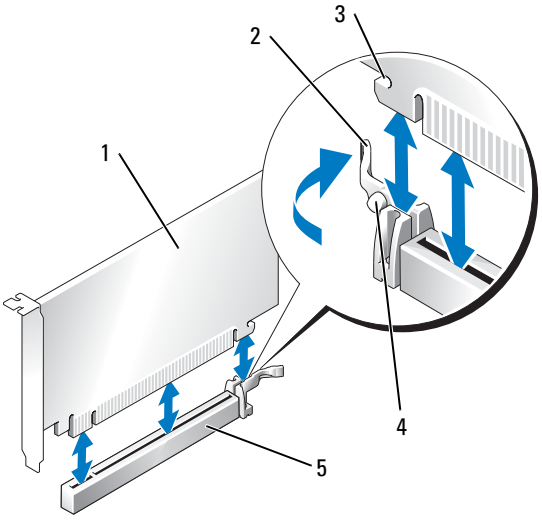
2 card

3 card-edge connector

4 card connector

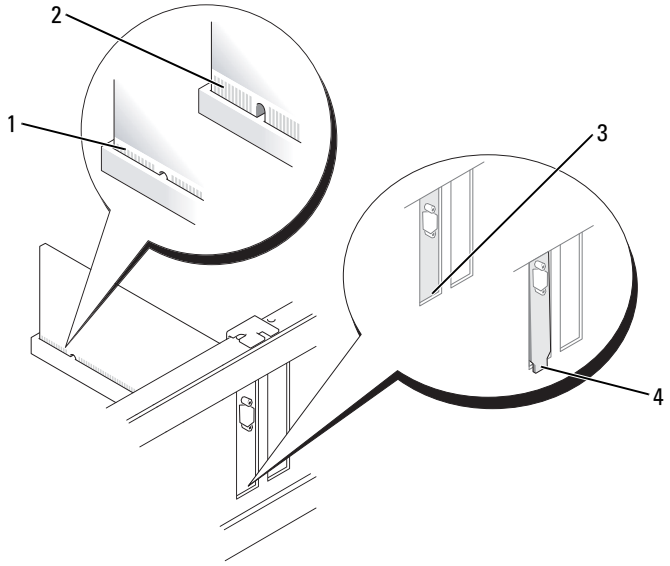
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

7 If you are installing a PCI Express x16 card, hold the securing-tab release lever away from the card connector as you insert the new card into the connector slot.



1 PCI Express x16 card
2 release lever
3 securing slot (not all cards)
4 securing tab
5 PCI Express x16 card connector

8 Place the card in the connector and press down firmly. Using the following illustration as a guide, ensure that the card is fully seated in the slot.



1 card fully seated

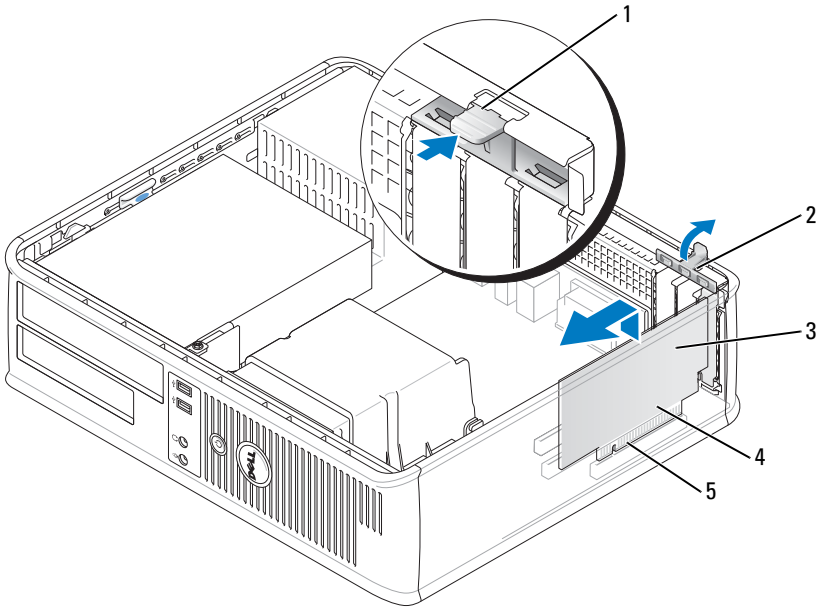
2 card not fully seated

3 bracket within slot

4 bracket caught outside of slot

NOTE: If you are installing a PCI Express x16 card, ensure that the securing tab on the connector's release lever fits into the notch on the front end of the card.

9 Gently rotate the release tab downward to move the card-retention latch into place to secure the cards.



1	release tab	4	card-edge connector
2	card-retention latch	5	card connector
3	card		

NOTICE: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10 Connect any cables that should be attached to the card.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

12 If you installed a sound card:

- **a** Enter system setup, select **Audio Controller**, and change the setting to **Off** (see "Entering System Setup" on page 280).
- **b** Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back or front panel.

13 If you installed a network adapter card and want to turn off the integrated network adapter:

- **a** Enter system setup, select **Network Controller**, and change the setting to **Off** (see "Entering System Setup" on page 280).

b Connect the network cable to the connector on the network adapter card. Do not connect the network cable to the integrated network connector on the back panel of the computer.

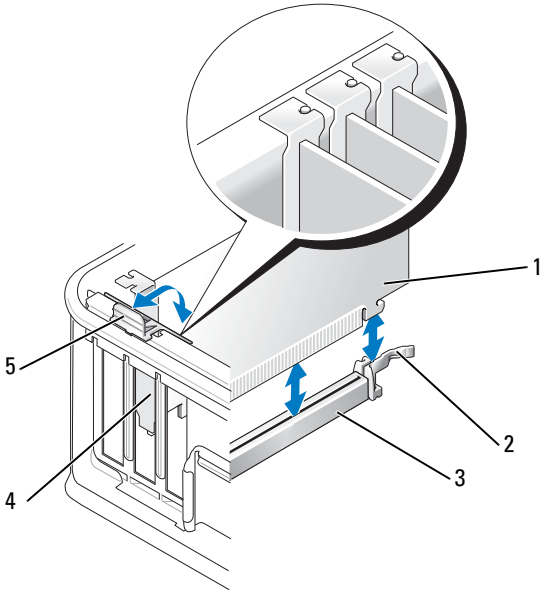
14 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

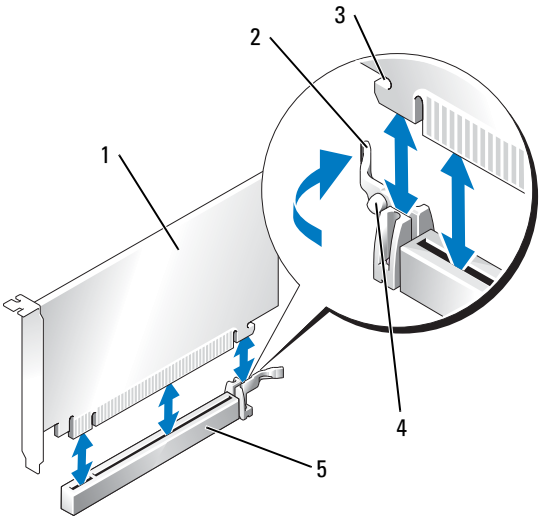
3 Gently rotate upward the release tab on the card-retention latch.



1	card	4	card insert
2	card-retention latch	5	release tab
3	system board connector		

4 If necessary, disconnect any cables connected to the card.

5 If you are replacing a PCI Express x16 card, remove the installed card by gently pulling the release lever away from the card until you release the securing tab from the dent in the card.



1 PCI Express x16 card
2 release lever
3 securing slot (not all cards)
4 securing tab
5 PCI Express x16 card connector

6 Grasp the card by its top corners, and ease it out of its connector.

7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

8 Rotate the release tab downward to snap the card-retention latch into place.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

10 Uninstall the card's driver. See the documentation that came with the card for instructions.

11 If you removed a sound card:

a Enter system setup, select **Audio Controller**, and change the setting to **On** (see "Entering System Setup" on page 280).

b Connect external audio devices to the audio connectors on the computer back panel.

12 If you removed a network adapter card:

a Enter system setup, select **Network Controller**, and change the setting to **On** (see "Entering System Setup" on page 280).

b Connect the network cable to the integrated network connector on the back panel of the computer.

Installing a PCI Card in the Riser-Card Cage

1 Follow the procedures in "Before You Begin" on page 21.

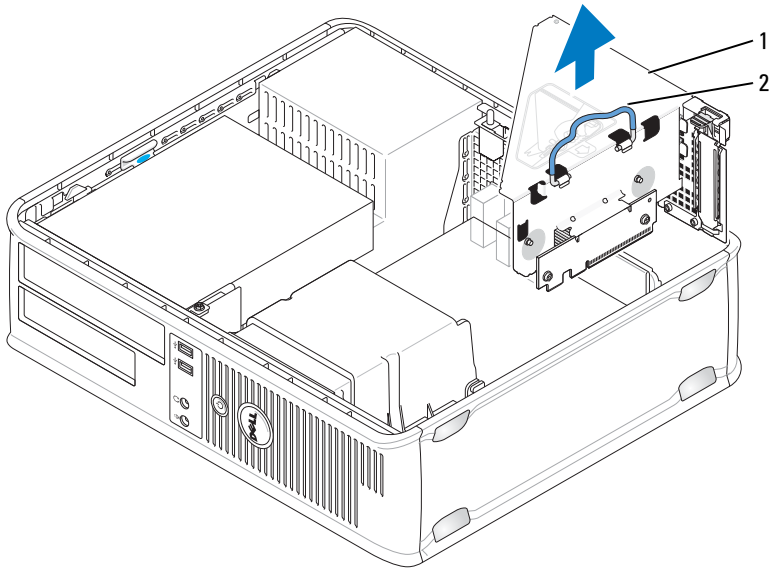
2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 If applicable, remove the card installed in the PCI3 connector on the system board.

4 Remove the riser-card cage:

a Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.

b Gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage

2 handle

5 If you are installing a new card, remove the filler bracket to create an empty card-slot opening.

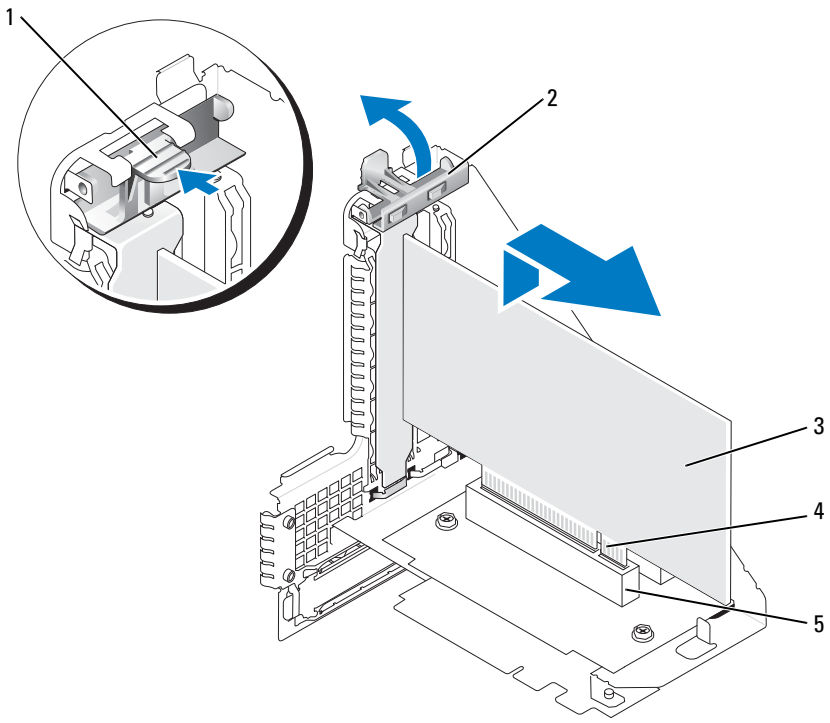
If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Grasp the card by its corners, and ease it out of its connector.

NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

6 Prepare the new card for installation.

CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

7 Press the release tab to raise the card-retention latch.



1	release tab	4	card-edge connector
2	card-retention latch	5	card connector
3	card		

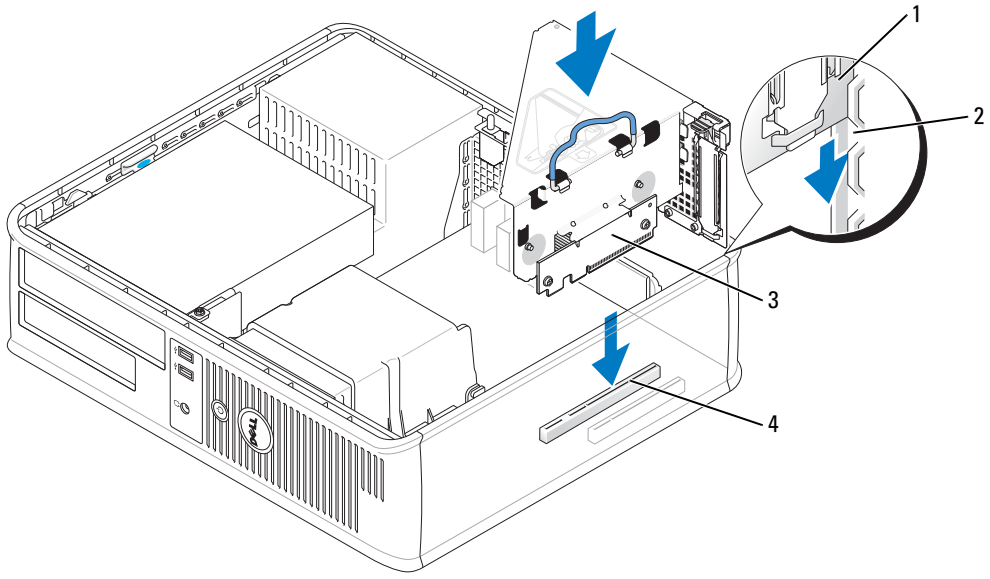
8 Insert the card firmly into the card connector on the riser-card cage.

9 Lower the card-retention latch and press it into place, securing the card(s) in the computer.

10 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure that the riser cards are fully seated in the connectors on the system board.



1	riser-card cage	3	riser cards (2)
2	slots	4	system board connectors (2)

11 Reconnect any cables that you removed in step 4.

12 Connect any cables that should be attached to the card.

NOTICE: Do not route card cables over or behind the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

13 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

14 If you installed a sound card, perform the following steps:

a Enter system setup, select **Audio Controller**, and change the setting to **Off** (see "Entering System Setup" on page 280).

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the microphone, speaker/headphone, or line-in connectors on the back panel.

15 If you installed a network adapter card and want to turn off the integrated network adapter:

a Enter system setup, select **Network Controller** and change the setting to **Off** (see "Entering System Setup" on page 280).

b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

NOTICE: If you disable the integrated network adapter, you will not have AMT functionality.

16 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card From the Riser-Card Cage

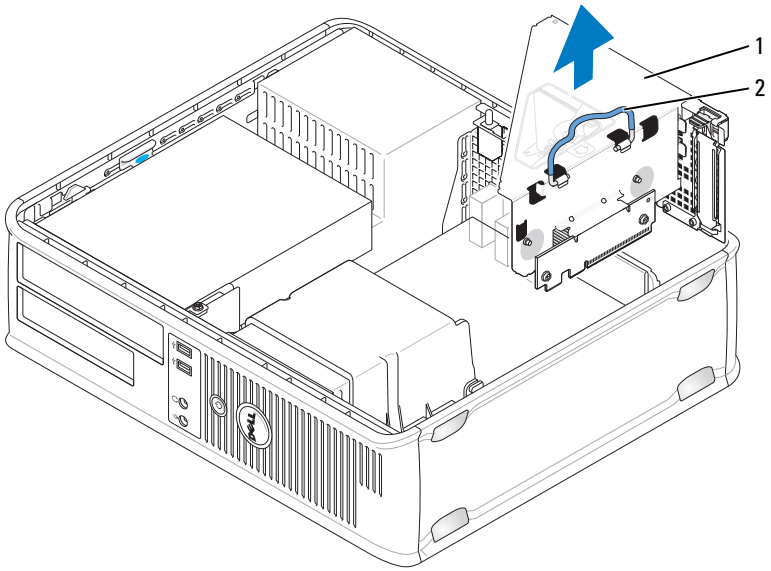
1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Remove the riser-card cage:

a Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.

b Gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage

2 handle

4 Press in on the tab to raise the card-retention latch.

5 If necessary, disconnect any cables connected to the card.

6 Grasp the card by its top corners, and ease it out of its connector.

7 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

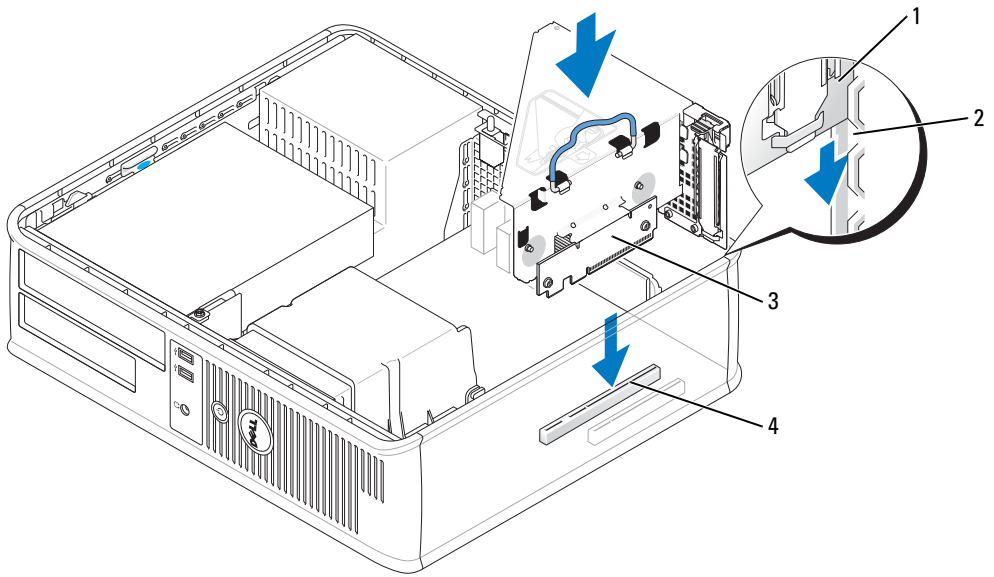
NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

8 Lower the card-retention latch and press it into place.

9 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure that the riser cards are fully seated in the connectors on the system board.



1	riser-card cage	3	riser cards (2)
2	slots	4	system board connectors (2)

10 Replace the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.

11 Uninstall the card's driver. See the documentation that came with the card for instructions.

12 If you removed a sound card:

a Enter system setup, select **Audio Controller**, and change the setting to **On** (see "Entering System Setup" on page 280).

b Connect external audio devices to the audio connectors on the computer back panel.

13 If you removed a network adapter card:

a Enter system setup, select **Network Controller**, and change the setting to **On** (see "Entering System Setup" on page 280).

b Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapter

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

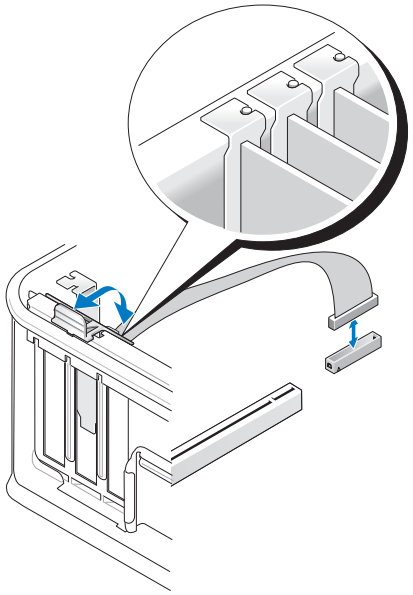
2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

4 Remove the filler bracket (if applicable).

NOTE: See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

5 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

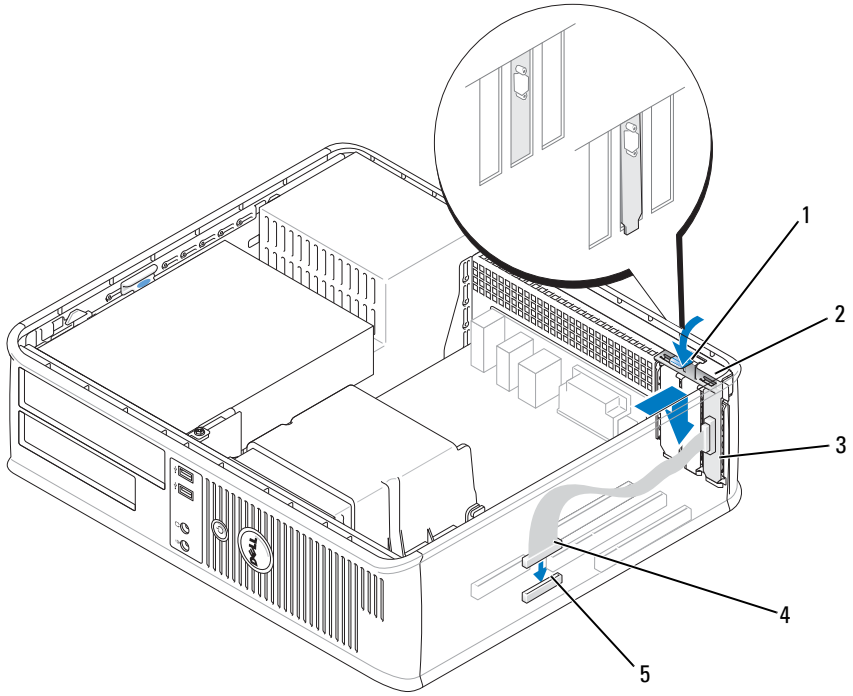


6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

7 Secure the card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.



1	release tab	2	adapter retention latch	3	PS/2 serial-port adapter bracket
4	serial port adapter connector	5	serial port adapter system board connector (SERIAL2)		

8 Connect the adapter cable to the PS/2 serial port adapter connector (SERIAL2) on the system board (see "System Board Components" on page 95).

NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

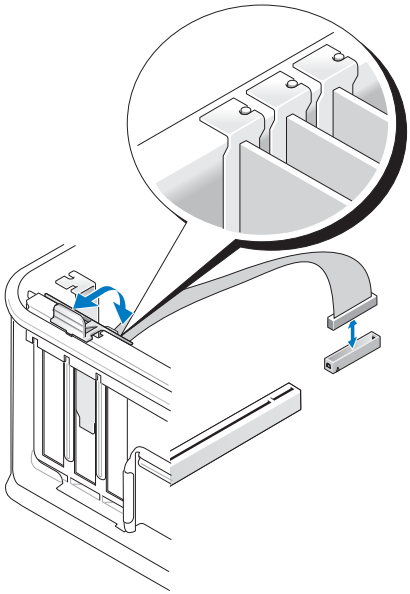
Removing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

4 Disconnect the PS/2 serial-port cable from the system board (see "System Board Components" on page 95).



5 Ease the PS/2 serial-port adapter bracket out of its retention slot.

6 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

8 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Installing a PS/2 Serial Port Adapter in the Riser-Card Cage

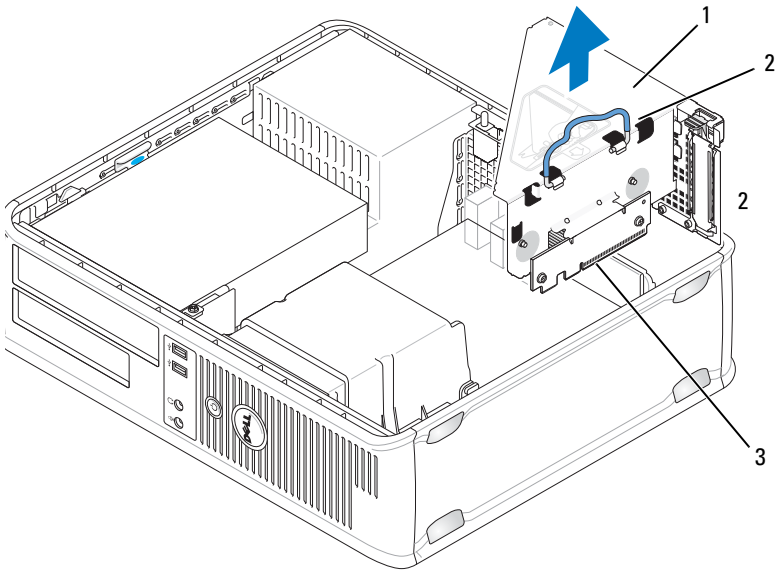
1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Remove the riser-card cage:

a Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.

b Rotate the riser-card cage handle up and gently pull on the handle to lift the riser-card cage up and away from the computer.



1 riser-card cage 2 handle 3 riser cards (2)

4 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

5 If you are installing a new PS/2 serial port adapter, remove the filler bracket to create an empty card-slot opening.

6 If you are replacing a PS/2 adapter that is already installed in the computer, remove the adapter.

7 If necessary, disconnect any cables connected to the adapter.

CAUTION: To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards or adapters.

8 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

9 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

10 Secure the card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11 Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SERIAL2) on the system board (see "System Board Components" on page 95).

12 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure that the riser-card connectors are fully seated in the connectors on the system board.

c Rotate the riser-card cage handle to the down position.

13 Connect any disconnected cables.

14 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

15 Install any drivers required for the PS/2 serial port adapter.

Removing a PS/2 Serial Port Adapter From the Riser-Card Cage

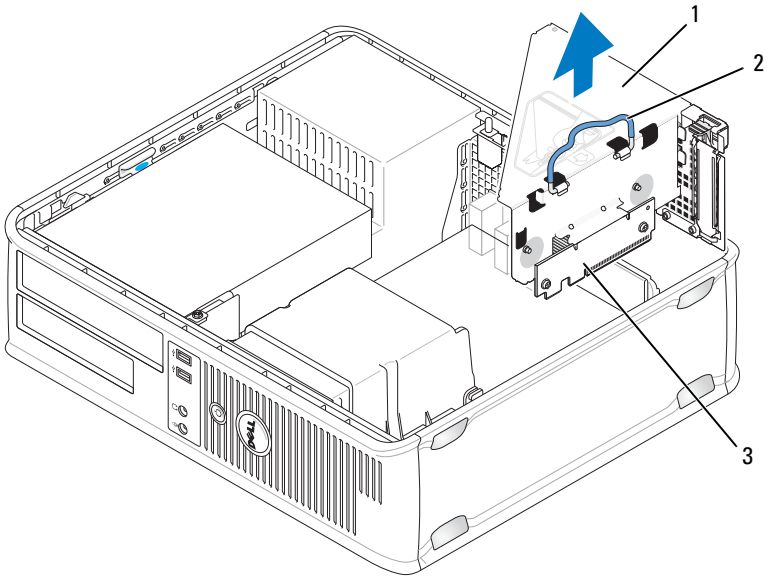
1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

3 Remove the riser-card cage:

a Check any cables connected to cards through the back panel openings. Disconnect any cables that will not reach the riser-card cage once they are removed from the computer.

b Rotate the riser-card cage handle up and gently pull on the handle and lift the riser-card cage up and away from the computer.



1 riser-card cage 2 handle 3 riser cards (2)

4 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

5 Disconnect the PS/2 serial-port cable from the system board (see "System Board Components" on page 95).

6 Grasp the PS/2 serial-port adapter bracket by its top corners, and ease it out of its connector.

7 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets also keep dust and dirt out of your computer.

8 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

9 Secure the card(s) by closing the card retention latch and snapping it into place.

10 Replace the riser-card cage:

a Align the tabs in the side of the riser-card cage with the slots on the side of the computer, and slide the riser-card cage down into place.

b Ensure that the riser-card connectors are fully seated in the connectors on the system board.

c Rotate the riser-card cage handle to the down position.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

12 Uninstall the adapter's driver. See the documentation that came with the adapter for instructions.

eSATA

eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chipset, approximately six times the data throughput of USB.

eSATA on your computer also supports *hot-plugging*. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

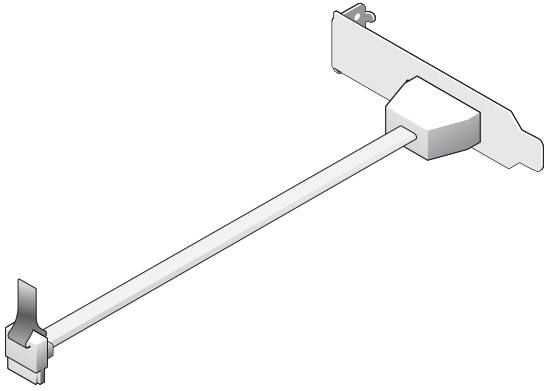
NOTE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing eSATA Without a Riser

1 Remove the computer cover (see "Removing the Computer Cover" on page 90).

2 Remove the filler panel for the card slot you are using for the eSATA connector.

3 Mount the bracket into the desired card slot opening.



4 Plug the free end of the eSATA cable into the eSATA connector on the system board (see "System Board Components" on page 95).

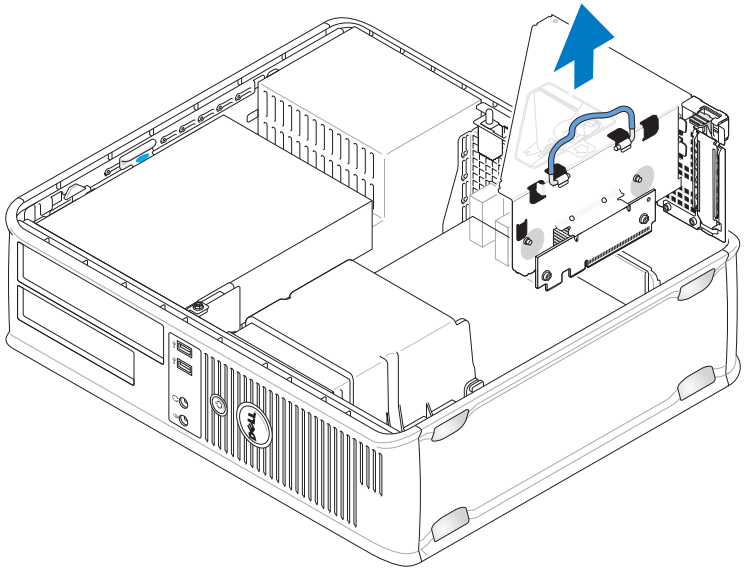
5 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

6 Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the `esata` option to enable the eSATA drive.

Installing eSATA With a Riser

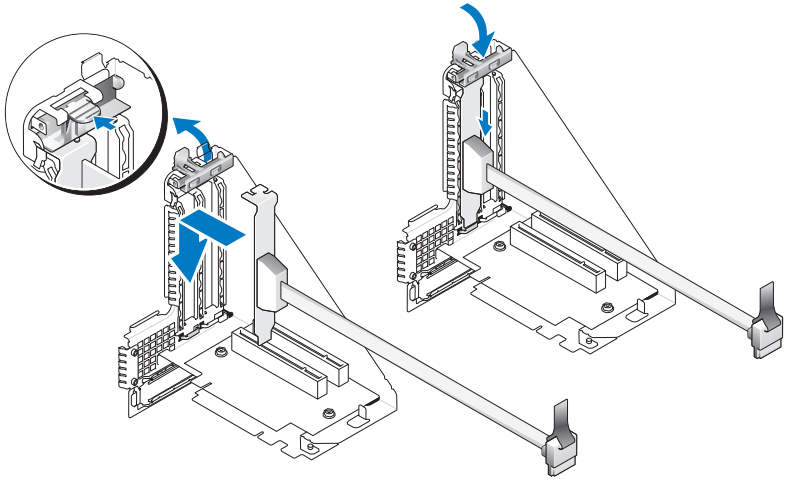
1 Remove the computer cover (see "Removing the Computer Cover" on page 27).

2 Remove the riser from your computer.

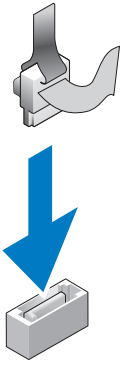


3 Press the blue release tab to remove the filler panel for the card slot you are using for the eSATA connector.

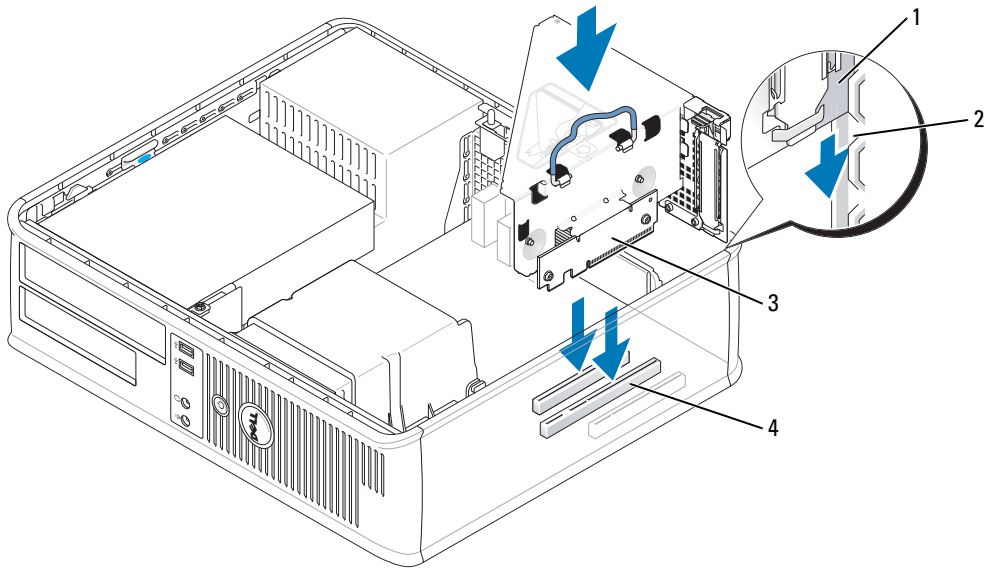
4 Insert the bracket for the eSATA connector into that opening and press down on the release tab to hold the bracket in place.



5 Plug the free end of the eSATA cable into the eSATA connector on the system board.



6 Replace the riser.



1	riser-card cage	3	riser cards (2)
2	slots	4	system board connectors (2)

7 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

8 Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the `esata` option to enable the eSATA drive.

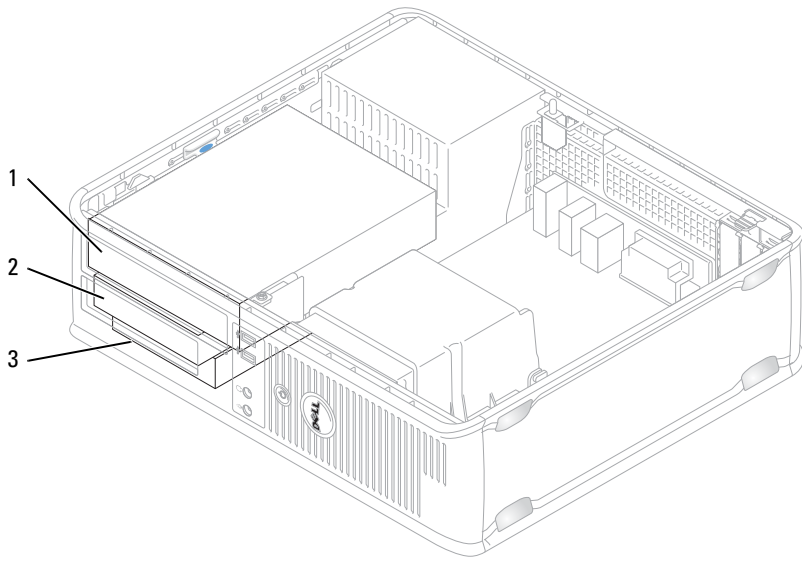
Drives

Your computer supports:

- One SATA (serial ATA) hard drive
- One 3.5-inch drive bay (to support a floppy drive, media card reader, or optional second SATA hard drive)
- One SATA optical drive
- One eSATA drive (with optional bracket)

NOTE: Due to the limited number of drive bays and controllers on this computer, you will not be able to connect all supported devices at once.

NOTE: If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive or media card reader) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.



1 optical drive
2 floppy drive
3 hard drive

General Drive Installation Guidelines

SATA connectors on the system board are labeled SATA0, SATA1, and SATA2. Hard drives must be connected to the lower-numbered SATA connectors. Any other SATA device (like an optical drive) must be connected to the remaining SATA connectors numbered higher than the one that the hard drive(s) is

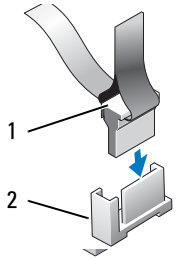
connected to. For example, if you have two SATA hard drives and one SATA optical drive, connect the two hard drives to the SATA0 and SATA1 connectors, and connect the SATA optical drive to the SATA2 connector. (See "System Board Components" on page 95 for the location of the SATA connectors on the system board.)

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

Data Interface Connectors

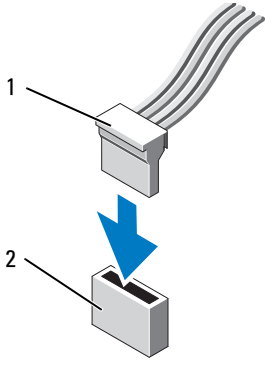
SATA Connector



1 data interface cable connector

2 data interface connector

Power Cable Connectors



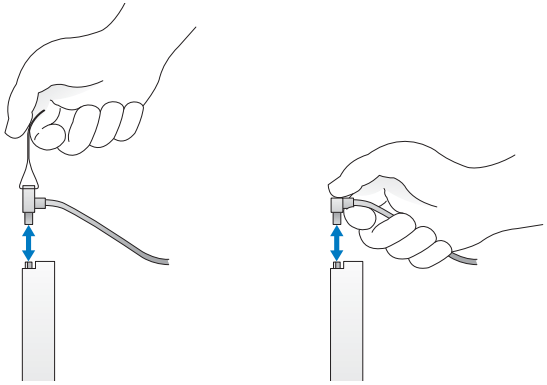
1 power cable

2 power input connector

Connecting and Disconnecting Drive Cables

When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a cable without a pull tab, hold the cable by the black connector at each end.



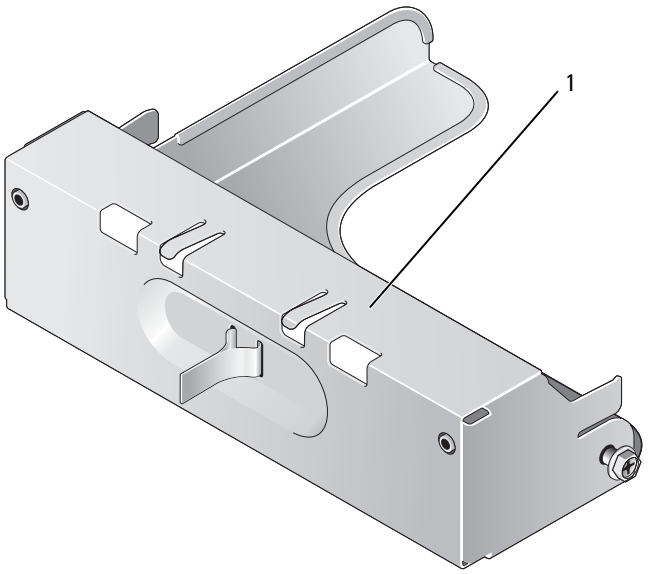
Drive Inserts

Your computer will come with a plastic insert with shoulder screws and a metal insert.

Removing Drive Inserts

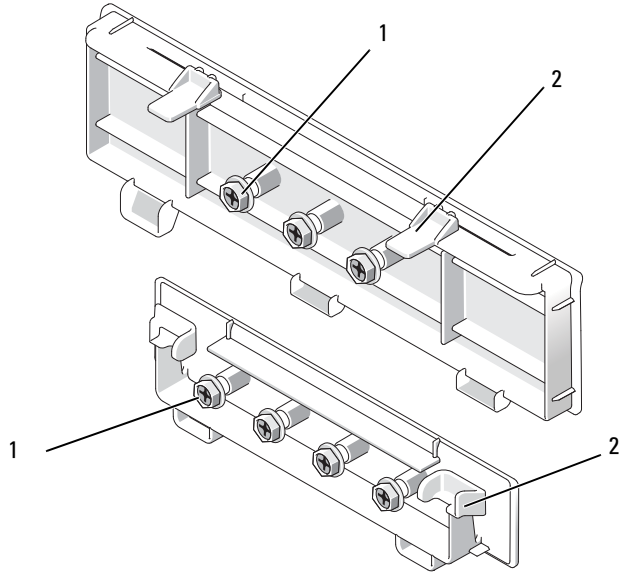
If you are installing a new drive:

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).
3. Lift the drive release latch.
4. Slide the metal bracket toward the back of the computer and lift up.



1 metal insert

5 Press the release tabs on the plastic insert and press from behind to remove.



1 shoulder screws 2 plastic drive insert

Replacing Drive Inserts

If you are removing a drive, and need to replace the inserts:

1. Place the plastic insert over the opening and press the insert tab down until the plastic insert snaps into place.
2. Slide the metal bracket toward the front of the computer and click into place.
3. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Optical Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

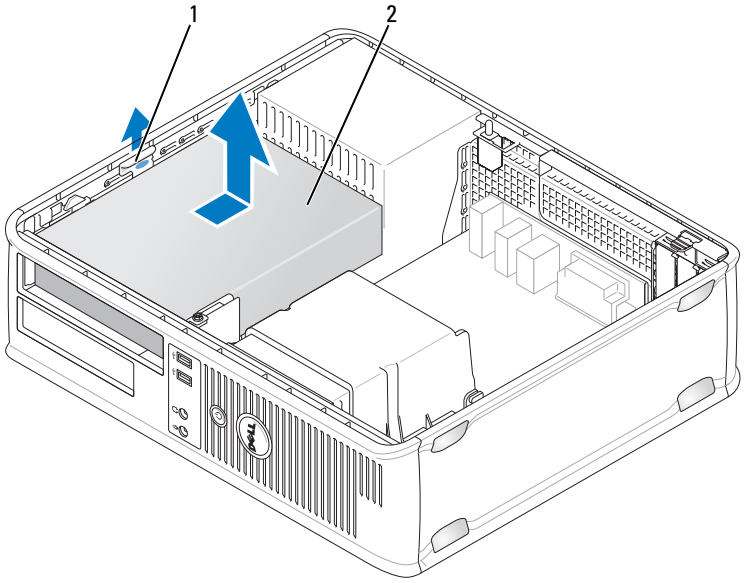
NOTE: If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive or media card reader) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert. See "Removing Drive Inserts" on page 129.

Removing an Optical Drive

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

3. Pull up on the drive-release latch and slide the drive towards the back of the computer. Then, lift up to remove the drive from the computer.



1 drive release latch

2 optical drive

4 Disconnect the power and data cables from the back of the drive.

5 If you are not replacing the optical drive at this time, install the optical drive insert by lowering it into the drive bay until it clicks into place. Contact Dell if you need a drive bay insert.

Installing an Optical Drive

1 Unpack the drive and prepare it for installation.

Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

2 Pull up on the drive-release latch and slide the drive towards the back of the computer. Then, lift up to remove the drive from the computer.

3 If you are installing a new drive:

a Remove the inserts (see "Removing Drive Inserts" on page 129).

b Insert the three shoulder screws removed from the insert into the sides of the new drive and tighten them.

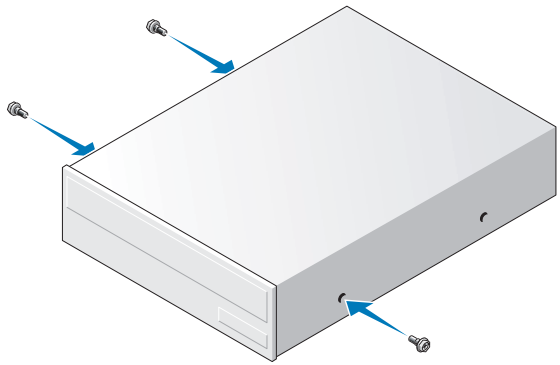
c Lift the drive release latch up and insert the new optical device.

4 If you are replacing an existing drive:

   a Follow procedures in "Removing an Optical Drive" on page 131 to remove the existing drive.

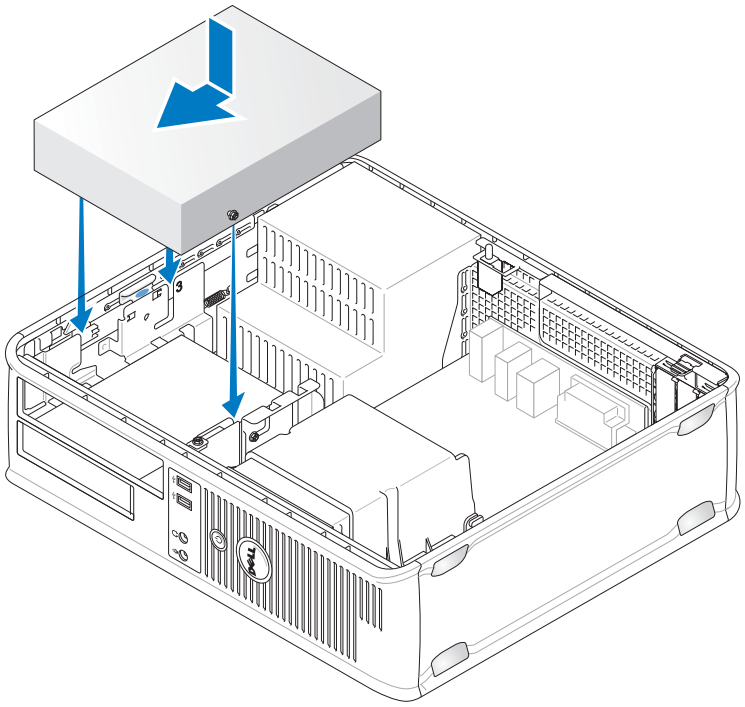
   b Remove the three shoulder screws from the existing drive.

   c Insert the three shoulder screws into the sides of the new drive and tighten them.



5 Connect the power and data cables to the drive.

6 Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.



7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

9 Update your configuration information by setting the appropriate **Drive** option (0 or 1) under **Drives**. See "System Setup" on page 280 for more information.

10 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Floppy Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTE: If you will be operating your computer without an optical drive or a 3.5-inch device (floppy drive) installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.

Removing a Floppy Drive

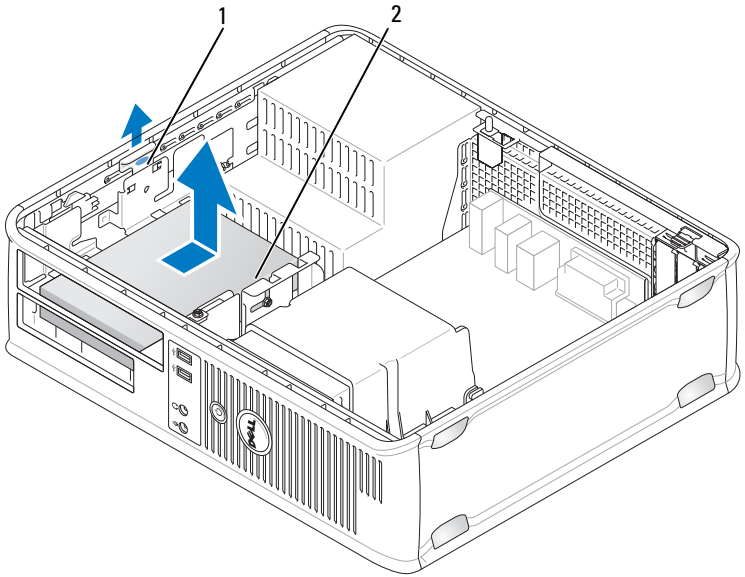
1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).

   NOTE: Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.

3. Remove the optical drive (if one exists) and carefully set it aside (see "Removing an Optical Drive" on page 131).

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4. Pull up on the drive-release latch and slide the floppy drive the back of the computer. Then, lift up to remove the drive from the computer.

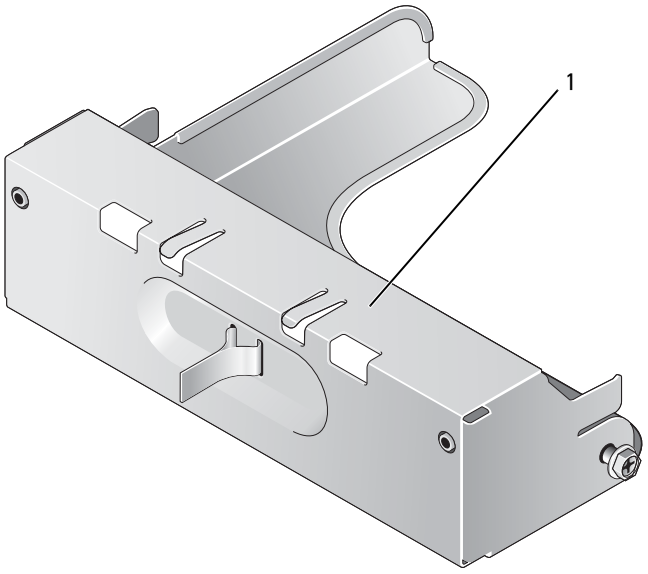


1 drive release latch
2 floppy drive

5. Disconnect the power and data cables from the back of the floppy drive.
6. If you are not replacing the floppy drive or media card reader at this time, install the floppy drive inserts (see "Replacing Drive Inserts" on page 131). Contact Dell if you need a drive bay insert.

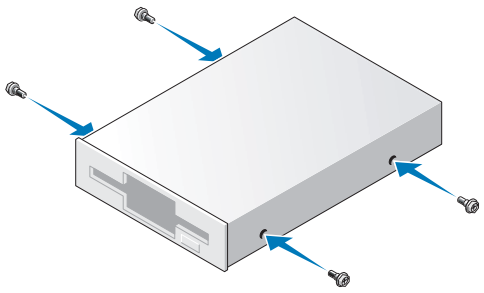
Installing a Floppy Drive

1. If you are installing a new floppy drive
   a. Remove the drive inserts (see "Removing Drive Inserts" on page 129).
   b. Pull to remove the floppy drive insert that should be installed in the drive bay.
   c. Remove the four shoulder screws from the drive panel insert.



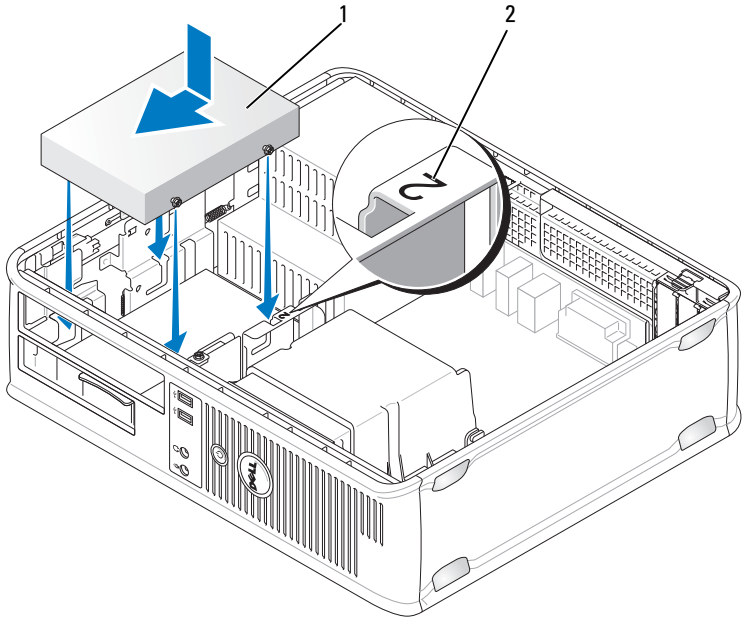
1 drive insert

2. If you are replacing an existing floppy drive:
   Remove the four shoulder screws from the existing drive or media card reader.
3. Insert the four shoulder screws into the sides of the new floppy drive and tighten them.



4 Attach the power and data cables to the floppy drive.

5 Align the shoulder screws with the screw guides, and slide the drive into the bay until it clicks into place.



1 power cable

2 slot verification number

6 Replace the optical drive (see "Optical Drive" on page 131).

7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

9 Enter system setup and set the **Diskette Drive** option to enable your new floppy drive (see "System Setup" on page 280).

10 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Media Card Reader

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTE: If you will be operating your computer without an optical drive or a 3.5-inch drive installed, the appropriate drive bay insert must be installed in place of the drive. Contact Dell if you need a drive bay insert.

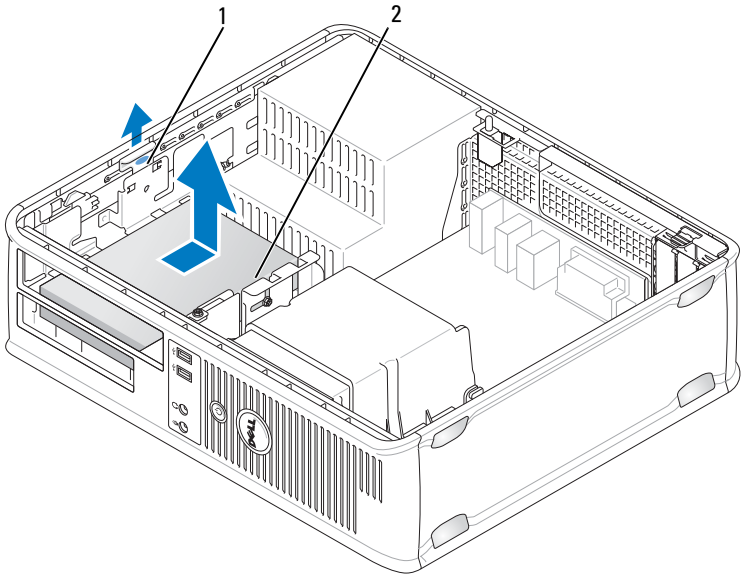
Removing a Media Card Reader

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).

   NOTE: Since the following steps do not require the complete removal of the optical drive, it is not necessary to disconnect the cables connecting the optical drive.
3. Remove the optical drive (if one exists) and carefully set it aside (see "Removing an Optical Drive" on page 131).

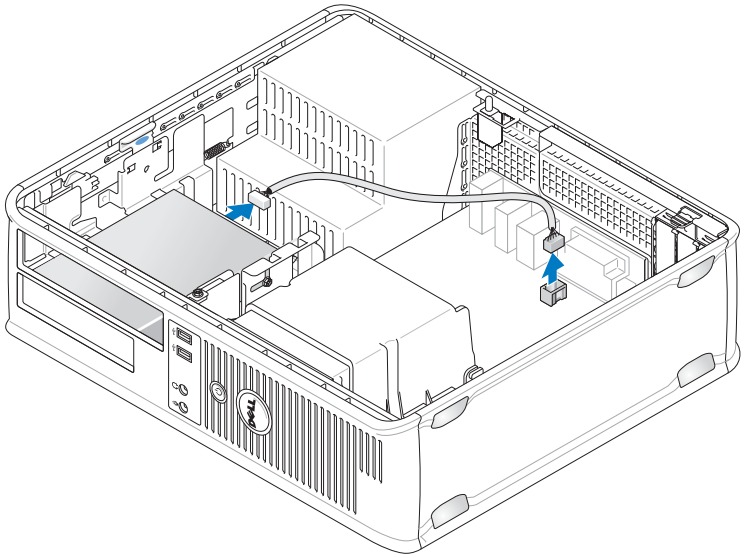
NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

4. Pull up on the drive-release latch and slide the media card reader to the back of the computer. Then, lift up to remove the drive from the computer.



1 drive release latch
2 media card reader

5 Disconnect the cable from the back of the media card reader and from the system board.

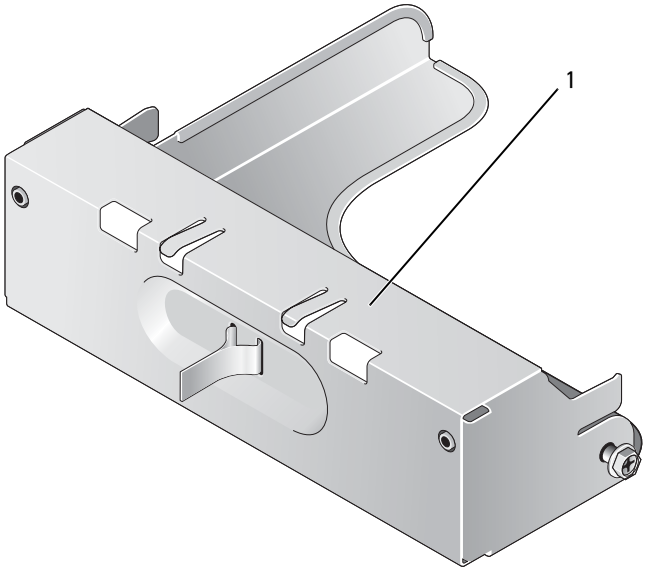


6 If you are not replacing the media card reader at this time, install the 3.5 inch drive insert (see "Replacing Drive Inserts" on page 131). Contact Dell if you need a drive bay insert.

Installing a Media Card Reader

1 If you are installing a new drive or media card reader:

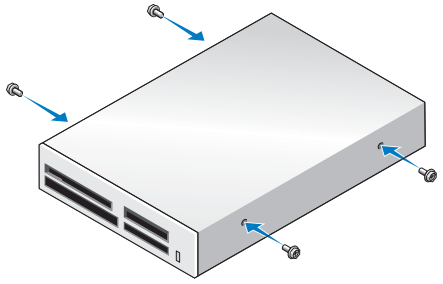
- **a** Remove the drive inserts (see "Removing Drive Inserts" on page 129).
- **b** Remove the four shoulder screws from the drive panel insert.
- **c** Pull to remove the 3.5 inch drive insert that should be installed in the drive bay.



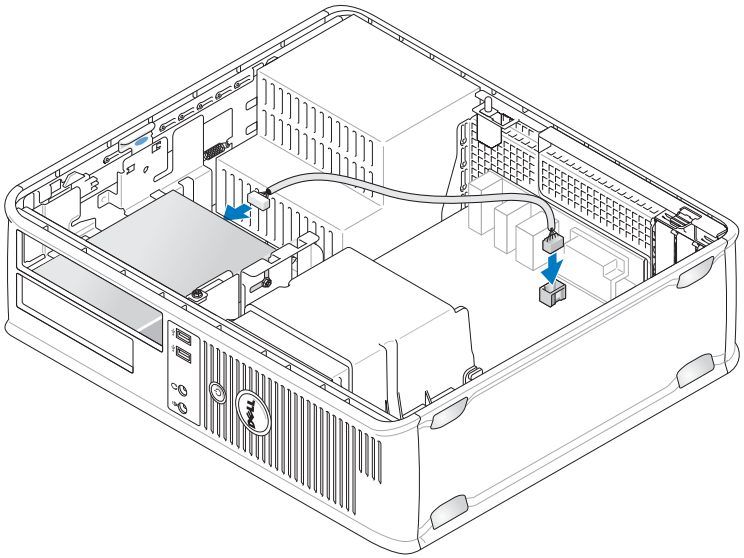
1 drive insert

2 If you are replacing an existing media card reader:
Remove the four shoulder screws from the existing media card reader.

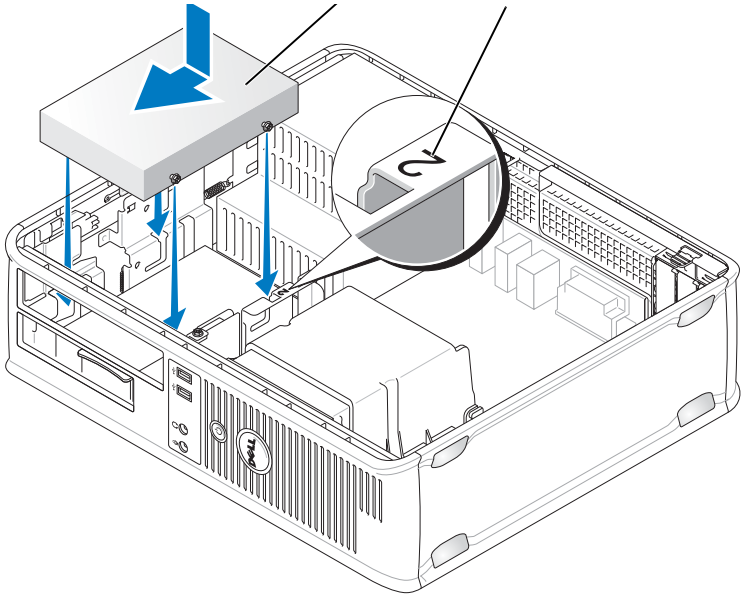
3 Insert the four shoulder screws into the sides of the new media card reader and tighten them.



4 Attach the cable to the media card reader and system board connector.



5 Align the shoulder screws with the screw guides, and slide the media card reader into the bay until it clicks into place.



1 power cable

2 slot verification number

6 Replace the optical drive (see "Optical Drive" on page 131).

7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Removing a Hard Drive

1 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

2 Check the documentation for the drive to verify that it is configured for your computer.

3 Follow the procedures in "Before You Begin" on page 21.

4 Remove the computer cover (see "Removing the Computer Cover" on page 90).

NOTE: Since the following steps do not require the complete removal of the optical drive and the floppy drive, it is not necessary to disconnect the cables connecting the two drives.

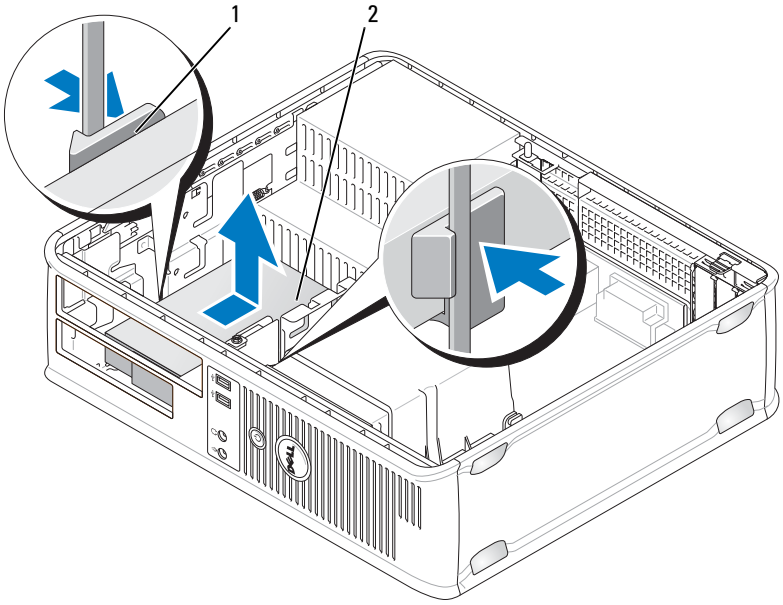
5 Remove the optical drive from the bay and carefully set it aside (see "Optical Drive" on page 131).

6 Remove the floppy drive from the 3.5-inch bay and carefully set it aside (see "Floppy Drive" on page 134).

7 Press in on the two plastic securing clips on each side of the drive and slide the drive towards the back of the computer.

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

8 Lift the drive out of the computer and disconnect the power and data cables from the drive.



1 securing clips (2)

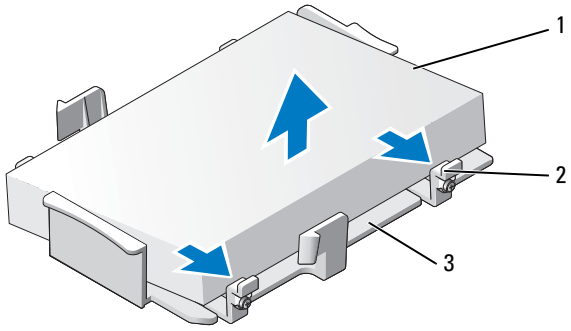
2 hard drive

Installing a Hard Drive

1. Check the documentation for the drive to verify that it is configured for your computer.

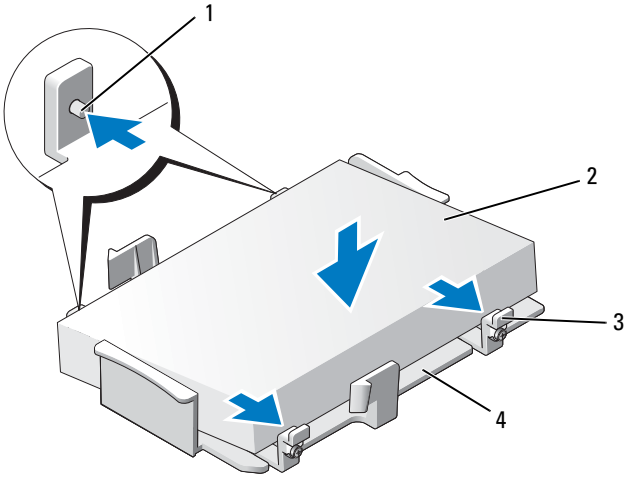
NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

2. Unpack the replacement hard drive, and prepare it for installation.
3. If your replacement hard drive does not have the plastic hard drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.



1 hard drive
2 release tabs (2)
3 plastic hard drive bracket

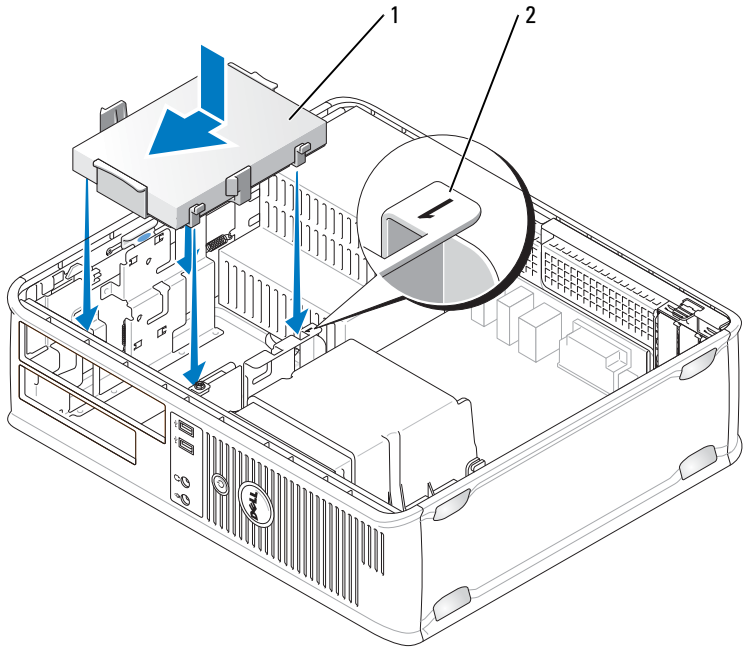
4 Attach the bracket to the new drive by snapping it onto the drive.



1 securing tabs (2)
2 drive
3 release tabs (2)
4 plastic hard drive bracket

5 Connect the power and data cables to the drive.

6 Locate the correct slot for the drive, and slide the drive into the bay until it clicks into place.



1 hard drive

2 slot verification number

7 Replace the floppy drive and optical drive.

8 Check all connectors to be certain that they are properly cabled and firmly seated.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

10 If the drive you just installed is the primary drive, insert a bootable medium into your boot drive.

11 Turn on the computer.

12 Enter system setup, and update the SATA port option under the Drives option list (see "Entering System Setup" on page 280).

13 Exit system setup, and reboot the computer.

14 Partition and logically format your drive.

NOTE: For instructions, see the documentation that came with your operating system.

15 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

16 Install your operating system on the hard drive.

NOTE: For instructions, see the documentation that came with your operating system.

Replacing a Second Hard Drive

For information on RAID configuration, see "About RAID Configurations" on page 295.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

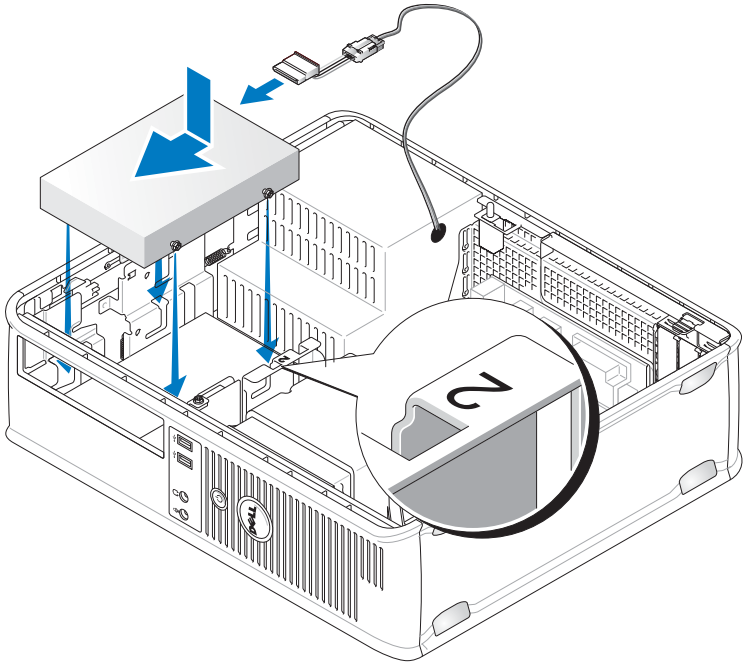
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

NOTICE: If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

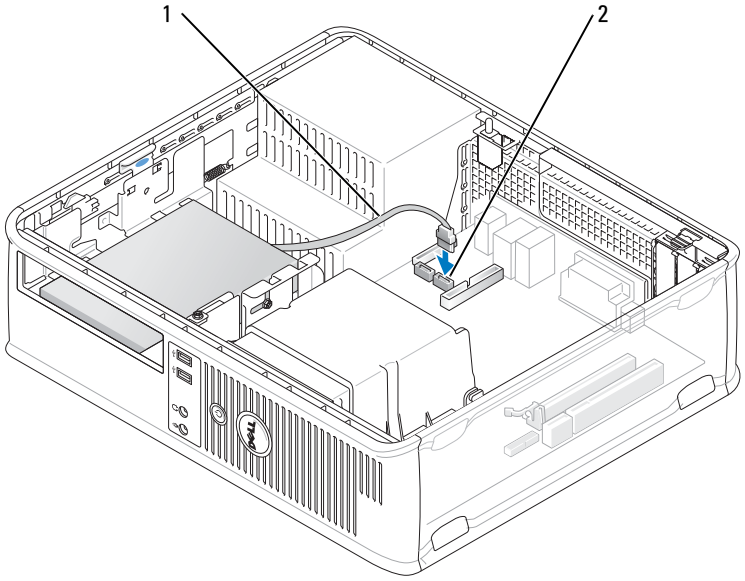
NOTE: Installation of a second hard drive is restricted to certain configurations of the Desktop computer.

1. Check the documentation for the drive to verify that it is configured for your computer.
2. Follow the procedures in "Before You Begin" on page 21.
3. Remove the computer cover (see "Removing the Computer Cover" on page 90).
4. Remove the optical drive (if your configuration has one). See "Removing an Optical Drive" on page 131.
5. Disconnect cable from the existing hard drive.
6. Remove the existing hard drive from the computer (see "Removing a Hard Drive" on page 142).
7. Remove screws from the existing hard drive and install them on the new hard drive.
8. Carefully slide the new hard drive into the upper bay until it clicks into place.
9. Insert reconnect the cable to the drive.



10 Locate an unused SATA connector on the system board and attach a data cable from the second hard drive to the SATA connector.

NOTICE: Always connect the data cable to the SATA1 connector when installing a second hard drive.



1	data cable	2	hard drive system board connector

11 Replace the optical drive (if your configuration has one). See "Installing an Optical Drive" on page 132.

12 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

13 Turn on the computer.

14 Enter system setup, and update the SATA port option under the **Drives** option list (see "Entering System Setup" on page 280).

15 Exit system setup, and reboot the computer.

16 Partition and logically format your drive.

NOTE: For instructions, see the documentation that came with your operating system.

17 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

18 Install your operating system on the hard drive.

NOTE: For instructions, see the documentation that came with your operating system.

Processor

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

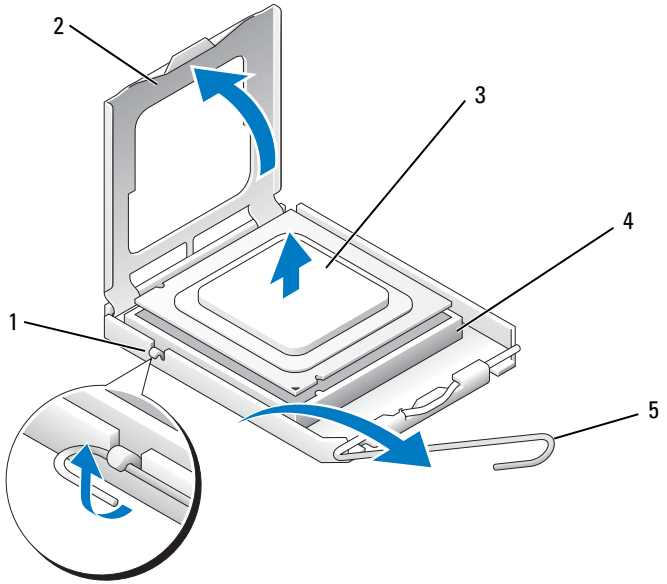
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).
3. Remove the heat sink assembly (see "Removing the Heat Sink Assembly" on page 94).

NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

4. Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then pull the lever back to release the processor.



1	center cover latch	2	processor cover	3	processor
4	socket	5	release lever		

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

5 Gently remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor.

Installing the Processor

NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 90).

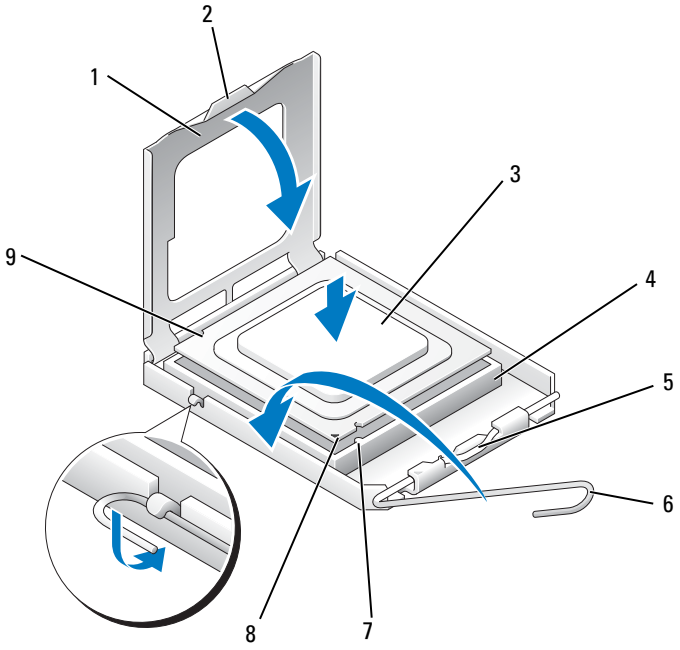
3 Unpack the new processor, being careful not to touch the underside of the processor.

NOTICE: You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

4 If the release lever on the socket is not fully extended, move it to that position.

5 Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

6 Align the pin-1 corners of the processor and socket.



1	processor cover	6	release lever
2	tab	7	front alignment-notch
3	processor	8	socket and processor pin-1 indicator
4	processor socket	9	rear alignment-notch
5	center cover latch		

NOTICE: To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

7 Set the processor lightly in the socket and ensure that the processor is positioned correctly.

8 When the processor is fully seated in the socket, close the processor cover.

Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

9 Pivot the socket release lever back toward the socket, and snap it into place to secure the processor.

10 Clean the thermal grease from the bottom of the heat sink.

NOTICE: Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

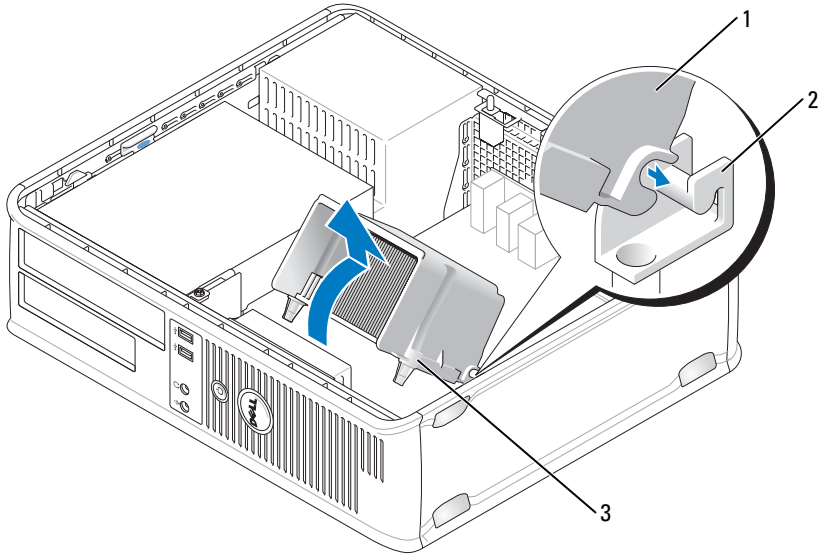
11 Apply the new thermal grease to the top of the processor.

12 Install the heat sink assembly:

a Place the heat sink assembly back onto the heat-sink assembly bracket.

b Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

NOTICE: Ensure that the heat sink assembly is correctly seated and secure.



1 heat sink assembly

2 heat-sink assembly bracket

3 captive screw housing (2)

13 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

I/O Panel

Removing the I/O Panel

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

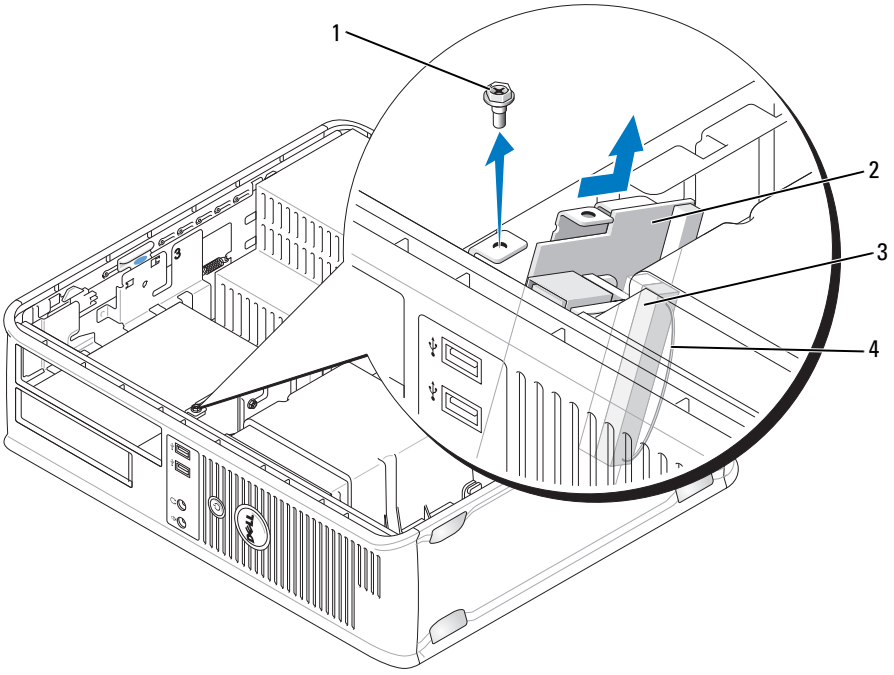
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTE: Note the routing of all cables before disconnecting them, so that you can re route them correctly when installing the new I/O panel.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).
3. Remove the heat sink assembly (see "Removing the Heat Sink Assembly" on page 94).
4. Move all other cables out of the way.
5. Remove the screw that secures the I/O panel to the desktop computer.

NOTICE: When sliding the I/O panel out of the computer, be extremely careful. Carelessness may result in damage to the cable connectors and the cable routing clips.

6. Gently rotate and slide the I/O panel away from the computer.
7. Remove the cable from the I/O panel by pulling on the pull tab.



1 securing screw
2 I/O panel
3 I/O cable connector
4 I/O connector pull loop

Replacing the I/O Panel

To replace the I/O panel, follow the removal procedures in the reverse order.

NOTE: Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.

Power Supply

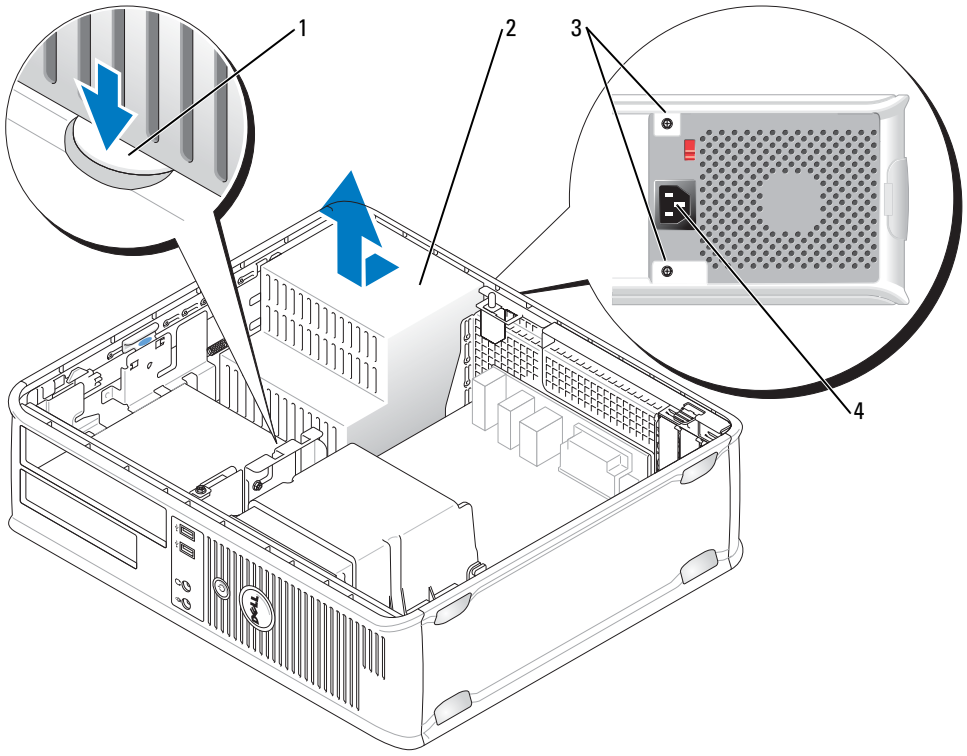
Replacing the Power Supply

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 90).
3. Disconnect the DC power cables from the system board and the drives.

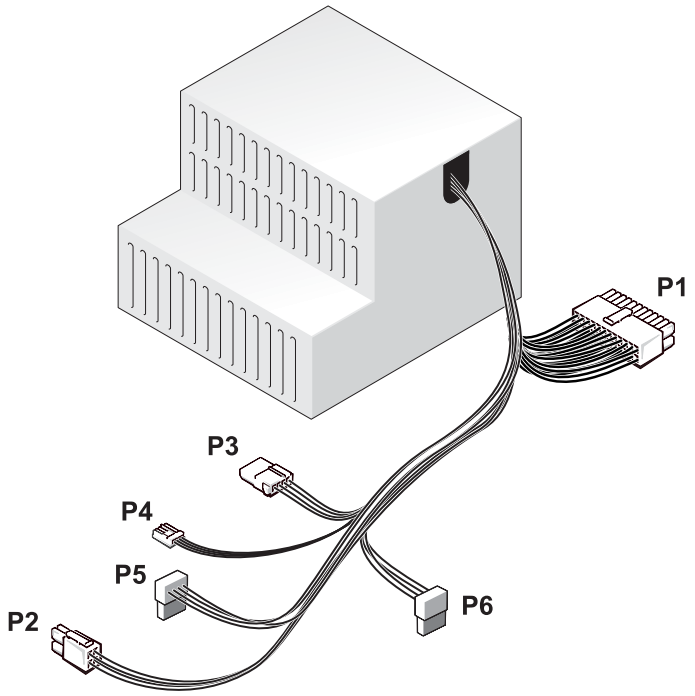
   Note the routing of the DC power cables underneath the tabs in the computer chassis as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent them from being pinched or crimped.
4. Remove the two screws that attach the power supply to the back of the computer chassis.
5. Remove the optical drive and carefully set it aside (see "Optical Drive" on page 131).
6. Press the release button located on the floor of the computer chassis.



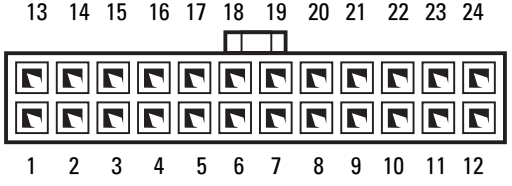
1 release button
2 power supply
3 screws (2)
4 AC power connector

7 Slide the power supply toward the front of the computer approximately one inch.
8 Lift the power supply up and out of the computer.
9 Slide the replacement power supply into place.
10 Replace the screws that secure the power supply to the back of the computer chassis.
11 Reconnect the DC power cables.
12 Replace the optical drive (see "Optical Drive" on page 131).
13 Connect the AC power cable to the connector.
14 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

DC Power Connectors



DC Power Connector P1



Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black
4	+5 VDC	Red
5	GND	Black

Pin Number	Signal name	18-AWG Wire
6	+5 VDC	Red
7	GND	Black
8	PS_PWRGOOD*	Gray
9	P5AUX	Purple
10	+12 VDC	White
11	+12 VDC	White
12	+3.3 VDC	Orange
13	+3.3 VDC/SE	Orange
14	+12 VDC*	Blue
15	GND	Black
16	PWR_PS_ON*	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	+5 VDC	Red
22	+5 VDC	Red

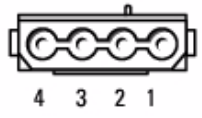
Pin Number	Signal name	18-AWG Wire
23	+5 VDC	Red
24	GND	Black

*Use 22-AWG wire instead of 18-AWG wire.

DC Power Connector P2

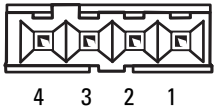
Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VDC	Yellow
4	+12 VDC	Yellow

DC Power Connector P3



Pin Number	Signal name	18-AWG Wire
1	+12VDC	Yellow
2	GND	Black
3	GND	Black
4	+5 VDC	Red

DC Power Connector P4



Pin Number	Signal Name	22-AWG Wire
1	+5 VDC	Red
2	GND	Black
3	GND	Black
4	+12 VDC	Yellow

DC Power Connector P5 and P6

Pin Number	Signal name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red

Pin Number	Signal name	18-AWG Wire
4	GND	Black
5	+12 VDC	Yellow

Speakers

Installing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 90).
3. Attach the speaker to the system fan.
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

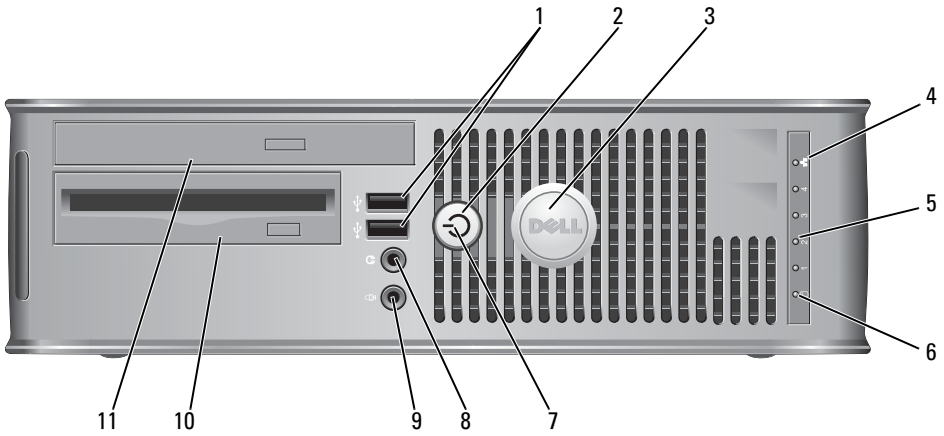
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 90).
3. Disconnect the cables from the system board.
4. Remove the speaker from the system fan.
5. Replace the computer cover.
6. Turn on power to the computer.

Small Form Factor Computer

About Your Small Form Factor Computer

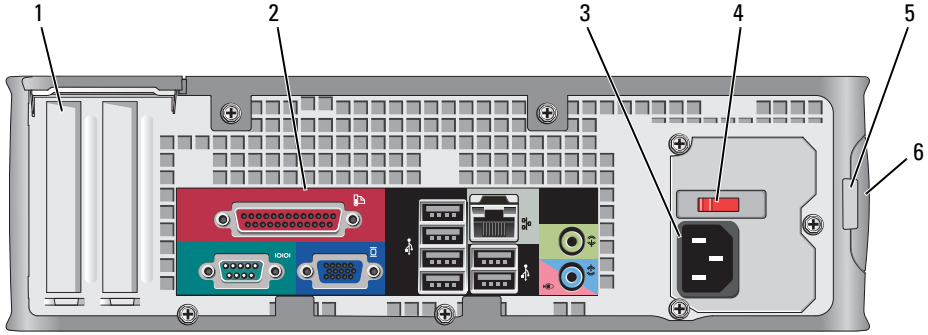
Front View



1	USB 2.0 connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 280 for more information about booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
2	power button	Press to turn on the computer. **NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 21 for more information. **NOTICE:** If your operating system has ACPI enabled, when you press the power button the computer will perform an operating system shutdown.
3	Dell badge	Can be rotated to match the orientation of your computer. To rotate, place fingers around the outside of the badge, press firmly, and turn the badge. You can also rotate the badge using the slot provided near the bottom of the badge.
4	LAN indicator light	Indicates that a LAN (local area network) connection is established.
5	diagnostic lights	Use the lights to help you troubleshoot a computer problem based on the diagnostic code. For more information, see "Diagnostic Lights" on page 347.
6	hard drive activity light	This light flickers when the hard drive is being accessed.

7	power light	The power light illuminates and blinks or remains solid to indicate different operating states: • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid amber — See "Power Problems" on page 339. To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management for Windows XP and Windows Vista" on page 292. See "Dell Diagnostics" on page 353 for a description of light codes that can help you troubleshoot problems with your computer.
8	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
9	microphone connector	Use the microphone connector to attach a microphone.
10	3.5-inch drive bay	Can contain an optional slimline floppy drive or optional media card reader.
11	5.25-inch drive bay	Can contain a slimline optical drive. Insert a CD or DVD (if supported) into this drive.

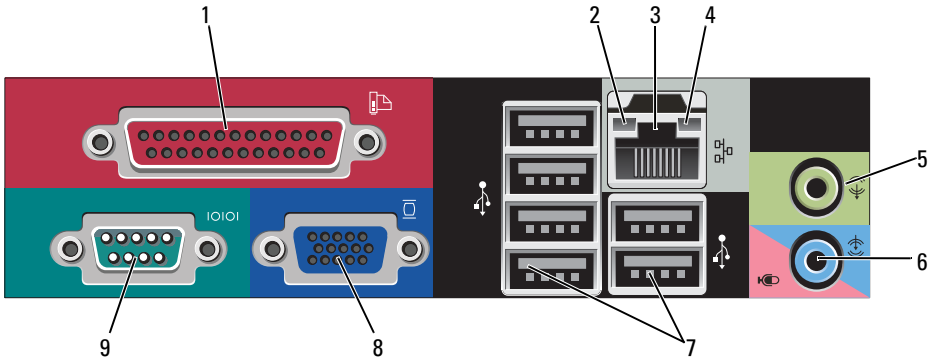
Back View



1	card slots	Access connectors for any installed PCI cards, PCI Express cards, PS/2, eSATA, and so on.
2	back panel connectors	Plug serial, USB, and other devices into the appropriate connectors (see "Back Panel Connectors" on page 167).
3	power connector	Insert the power cable.

4	voltage selection switch	Your computer is equipped with a manual voltage-selection switch. To help avoid damaging a computer with a manual voltage selection switch, set the switch for the voltage that most closely matches the AC power available in your location. **NOTICE:** In Japan, the voltage selection switch must be set to the 115-V position. Also, ensure that your monitor and attached devices are electrically rated to operate with the AC power available in your location.
5	padlock ring	Insert a padlock to lock the computer cover.
6	cover release latch	Allows you to open the computer cover.

Back Panel Connectors



1	parallel connector	Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector. **NOTE:** The integrated parallel connector is automatically disabled if the computer detects an installed card containing a parallel connector configured to the same address. For more information, see "System Setup Options" on page 281.
2	link integrity light	• Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1-Gbps (or 1000-Mbps) network and the computer. • Off — The computer is not detecting a physical connection to the network.

3	network adapter connector	To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **NOTE:** Do not plug a telephone cable into the network connector. For VPro to work, the network cable must be connected to the onboard NIC. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
4	network activity light	Flashes a yellow light when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
5	line-out connector	Use the green line-out connector (available on computers with integrated sound) to attach headphones and most speakers with integrated amplifiers.
6	line-in/microphone connector	Use the blue and pink line-in/microphone connector (available on computers with integrated sound) to attach a record/playback device such as a cassette player, CD player, or VCR; or a personal computer microphone for voice or musical input into a sound or telephony program.
7	USB 2.0 connectors (6)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
8	video connector	Plug the cable from your VGA-compatible monitor into the blue connector. **NOTE:** If you purchased an optional graphics card, this connector will be covered by a cap. Connect your monitor to the connector on the graphics card. Do not remove the cap. **NOTE:** If you are using a graphics card that supports dual monitors, use the y-cable that came with your computer.
9	serial connector	Connect a serial device, such as a handheld device, to the serial port. For more information, see "System Setup Options" on page 281.

Removing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

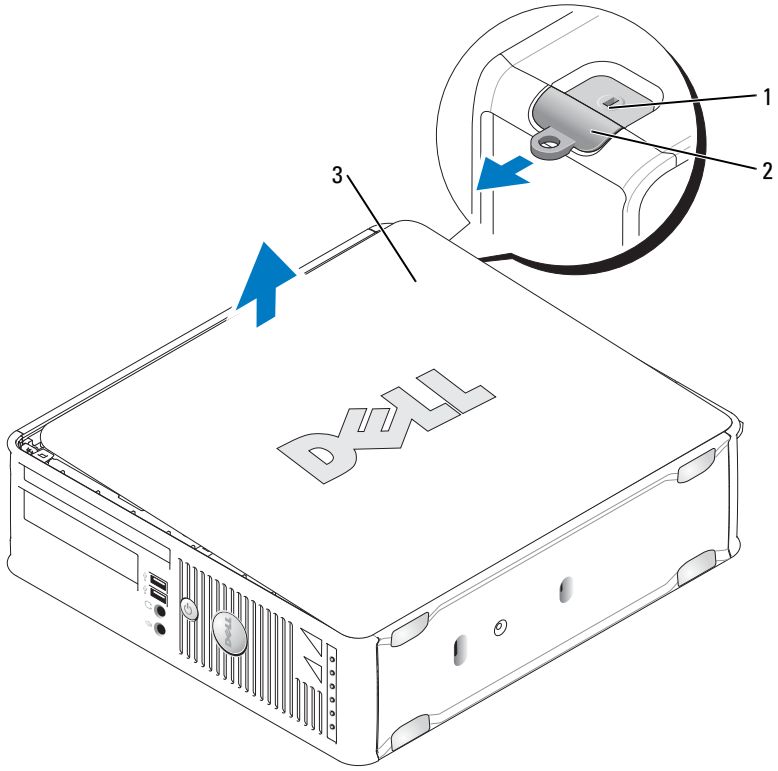
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in "Before You Begin" on page 21.
2. If you have installed a padlock through the padlock ring on the back panel, remove the padlock.
3. Locate the cover release latch shown in the illustration. Then, slide the release latch back as you lift the cover.

4 Grip the sides of the computer cover and pivot the cover up using the bottom hinges as leverage points.

5 Remove the cover from the hinge tabs and set it aside on a soft nonabrasive surface.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.



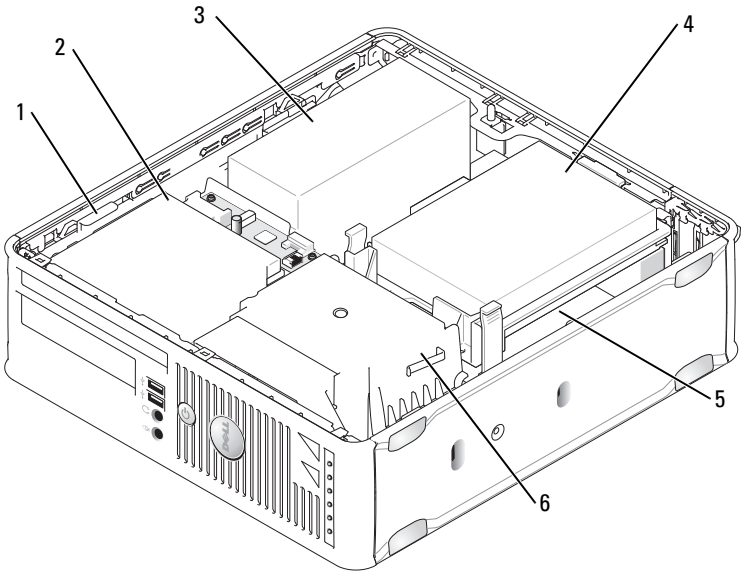
1 security cable slot
2 cover release latch
3 computer cover

Inside Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To avoid electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

NOTICE: Be careful when opening the computer cover to ensure that you do not accidentally disconnect cables from the system board.



1	drive-release latch	4	hard drive
2	optical drive	5	system board
3	power supply and fan	6	heat sink assembly

Chassis Intrusion Switch

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

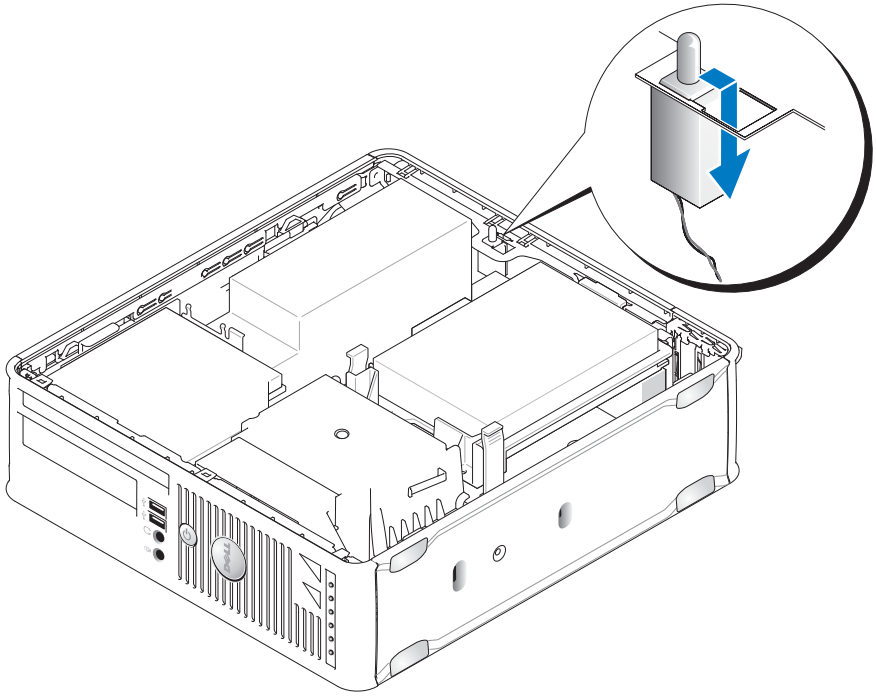
NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop, and small form factor computers; it may not be present on your computer.

Removing the Chassis Intrusion Switch

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. Remove the hard drive (see "Removing a Hard Drive" on page 197).
4. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.

5 Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

NOTE: You may feel a slight resistance as you slide the switch out of the slot.



Replacing the Chassis Intrusion Switch

1 Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until it snaps securely into place.

2 Reconnect the cable to the system board.

3 Replace the hard drive (see "Installing a Hard Drive" on page 199).

4 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

5 If you are using a computer stand, attach it to the computer.

Resetting the Chassis Intrusion Detector

1 Turn on (or restart) your computer.

2 When the blue DELL™ logo appears, press <F2> immediately.

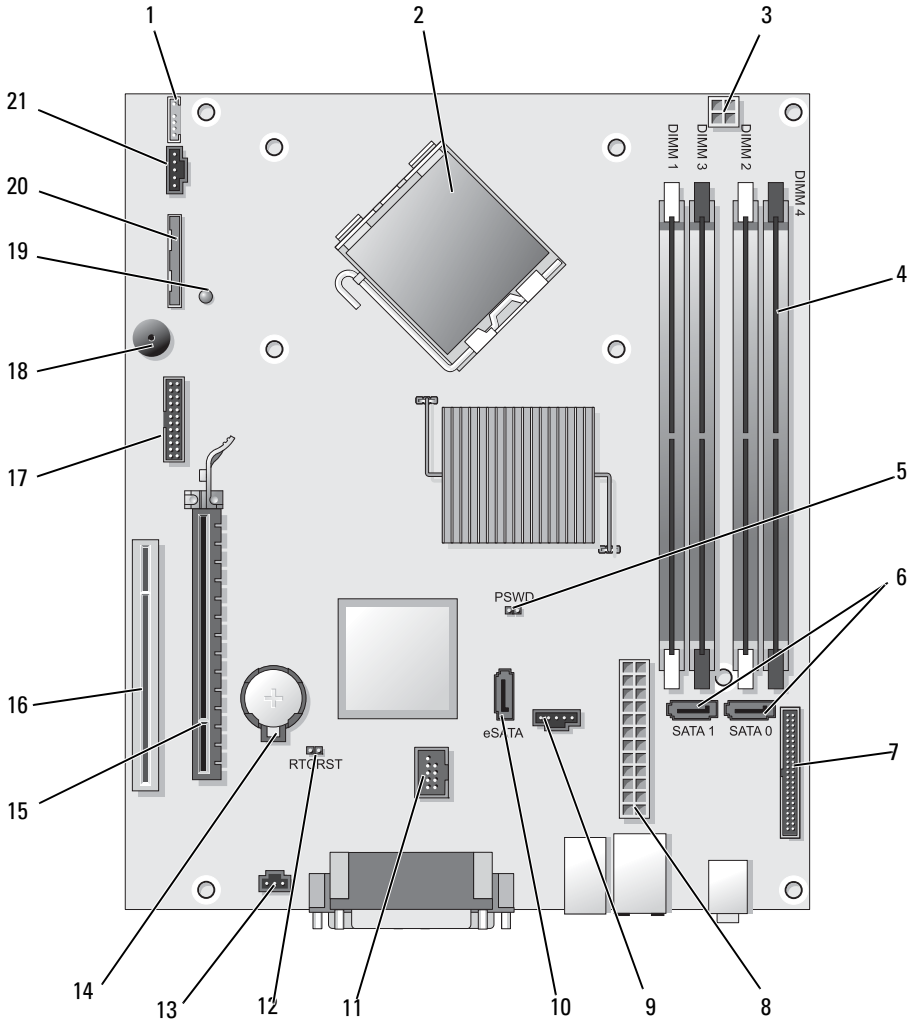
If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.

3 Select the **Chassis Intrusion** option and then press the left- or right-arrow key to select **Reset**. Change the setting to **On**, **On-Silent**, or **Disabled**.

NOTE: The default setting is **On-Silent**.

4 Save your BIOS settings and exit system setup.

System Board Components



1 internal speaker connector (INT_SPKR)
2 processor connector (CPU)
3 processor power connector (12VPOWER)
4 memory module connectors (DIMM_1, DIMM_2, DIMM_3, DIMM_4)
5 password jumper (PSWD)
6 SATA connectors (SATA0, SATA1)
7 front-panel connector (FRONTPANEL)
8 power connector (POWER)
9 fan connector (FAN_HDD)
10 eSATA connector (eSATA)
11 internal USB connector (INT_USB)
12 RTC reset jumper (RTCRST)
13 intrusion switch connector (INTRUDER)
14 battery socket (BATTERY)
15 PCI Express x16 connector (SLOT1)
16 PCI connector (SLOT2)
17 serial connector (SERIAL2)
18 system board speaker (BEEP)
19 aux power LED (aux_LED)
20 floppy drive connector (DSKT)
21 fan connector (FAN_CPU)

Small Form Factor Computer Specifications

Microprocessor	
Microprocessor type	The following are supported: • Intel® Core™2 • Intel vPro™ • Intel Celeron®
Internal cache	L1: up to 128 KB; L2: up to 8 MB (depending on your processor)

Memory	
Type	667-MHz or 800-MHz DDR2 SDRAM
Memory connectors	4
Memory modules supported	512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 1 GB; single-channel: 512 MB
Maximum memory	64-bit operating system: 8 GB 32-bit operating system: 4 GB
BIOS address	F0000h

Computer Information	
Chipset	Intel Q35 Express Chipset w/ICH9DO
Data bus width	64 bits
Address bus width	32 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	32 Mb
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication iAMT 3.0

Video	
Type	• Intel Graphics Media Accelerator 3100 (integrated on system board) • PCI Express x16 slot can support either a PCI Express graphics card or a DVI graphics card (for dual-monitor support)
Audio	
Type	ADI 1984 High Definition Audio
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog
Controllers	
Drives	two SATA controllers and one eSATA controller supporting one device each
Expansion Bus	
Bus type	PCI 2.3 PCI Express 1.0A SATA 1.0A and 2.0 USB 2.0
Bus speed	PCI: 133 MBs PCI Express x16: 8 GB/s bidirectional speed SATA: 1.5 Gbps and 3.0 Gbps USB: 480 Mbps
Cards:	low-profile cards supported
PCI:	
connector	one
connector size	120 pins
connector data width (maximum)	32 bits
PCI Express:	
connector	one x16
power	25 W (maximum)
connector size	164 pins (x16)
connector data width (maximum)	16 PCI Express lanes (x16)

Drives	
Externally accessible	one bay for a slimline floppy drive; one bay for a slimline optical drive
Internally accessible	one bay for a 1-inch-high hard drive

Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Optional PS/2 with secondary serial port adapter	two 6-pin mini-DINs **NOTE:** This option uses the PCI slot.
Video	15-pin VGA connector
Network adapter	RJ45 connector
USB	two front-panel and six back panel USB 2.0–compliant connectors
Audio	two connectors for line-in/ microphone and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
internal USB	10-pin header for optional media card reader (in 3.5-inch drive bay)
SATA	two 7-pin connectors
eSATA	one 7-pin connector
Floppy drive	34-pin connector
Serial	12-pin connector for optional secondary serial port card
Fan	two 5-pin connectors
PCI 2.3	one 120-pin connector
PCI Express	one 164-pin (x16) connector
Front panel	40-pin connector

Key Combinations	
<Ctrl><Alt><Del>	If you are running Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during system start-up only)
<F3>	automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup **Boot Sequence** option (during system startup only)
<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard drive and system diagnostics
<Ctrl><p>	displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

Controls and Lights	
Power control	push button
Power light	green light — blinking green indicates sleep mode; solid green indicates power-on state. amber light — blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See "Power Problems" on page 339.)
hard drive access light	green
Link light	solid green light indicates network connection
Link integrity light (on integrated network adapter)	green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	yellow blinking light
Diagnostic lights	four lights on the front panel (See "Dell Diagnostics" on page 353.)
Standby power light	AUX_PWR on the system board

Power	
DC power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws minimal power from the internal coin cell battery even when the computer is not drawing power from the AC power source.
Wattage	275 W

Power *(continued)*	
Heat dissipation	938 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
Voltage	manual selection power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Height	9.26 cm (3.65 inches)
Width	31.37 cm (12.35 inches)
Depth	34.03 cm (13.40 inches)
Weight	7.4 kg (16.4 lb)

Environmental	
Temperature:	
Operating	10° to 35°C (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 20 inches/sec (50.8 cm/sec)
Storage	27-G faired square wave with a velocity change of 200 inches/sec (508 cm/sec)
Altitude:	
Operating	–15.2 to 3048 m (–50 to 10,000 ft)
Storage	–15.2 to 10,668 m (–50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

Cards

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

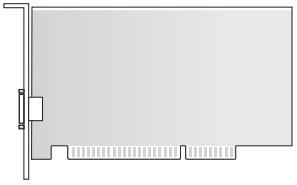
NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintains the airflow that cools your computer.

Your Dell™ computer supports a PS/2 serial port adapter and provides the following connectors for PCI and PCI Express cards:

- One low-profile PCI card slot
- One low-profile PCI Express x16 card slot

NOTE: Your Dell computer uses only PCI and PCI Express slots. ISA cards are not supported.

PCI Cards

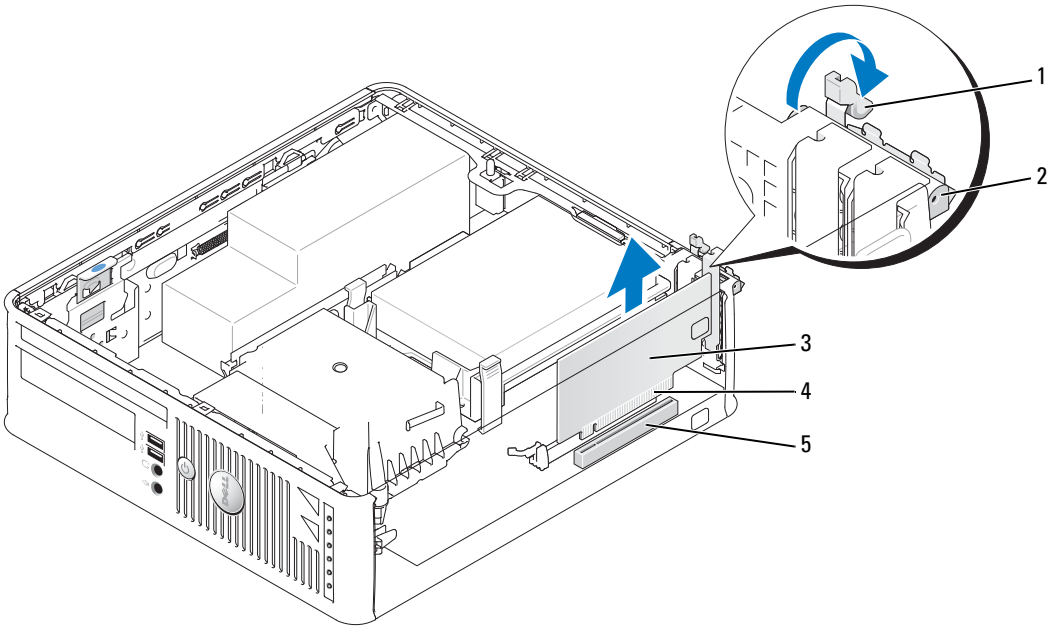


Installing a PCI Card

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).

NOTE: For PCI card locations, see "System Board Components" on page 172.

3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.



1	release tab	2	card retention latch	3	card
4	card-edge connector	5	card connector		

4 If you are installing a new card, remove the filler bracket to create a card-slot opening. Then continue with step 6.

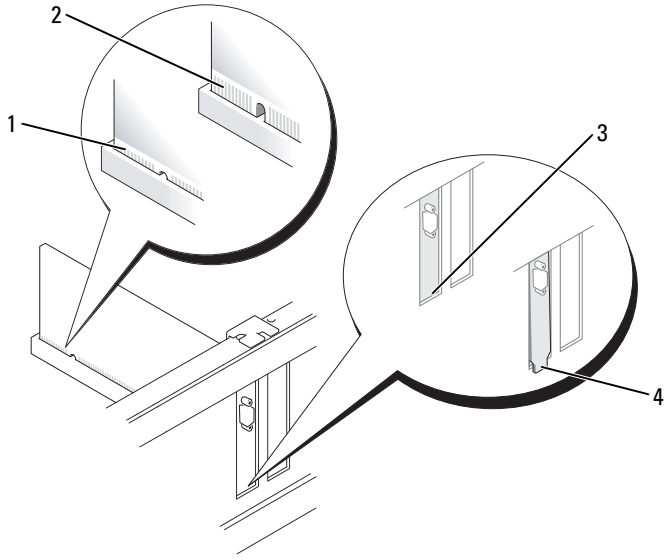
5 If you are replacing a card that is already installed in the computer, remove the card. If necessary, disconnect any cables connected to the card. Then continue with step 6.

6 Prepare the card for installation.

CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

7 Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1 card fully seated 2 card not fully seated 3 bracket within slot

4 bracket caught outside of slot

8 Before closing the card retention latch, ensure that:

- The tops of all cards and filler brackets are flush with the alignment guide
- The notch in the top of the card or filler bracket fits around the alignment guide

9 Secure the card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

10 Connect any cables that should be attached to the card.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

NOTE: See the documentation that came with the card regarding the card's cable connections.

12 If you installed a sound card:

a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 280).

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back Panel Connectors" on page 167).

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13 If you installed a network adapter card and want to turn off the integrated network adapter:

a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 280).

b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

NOTICE: If you disable the integrated network adapter, you will not have AMT functionality.

14 Install any drivers required for the card as described in the card documentation.

Removing a PCI Card

1 Follow the procedures in "Before You Begin" on page 21.

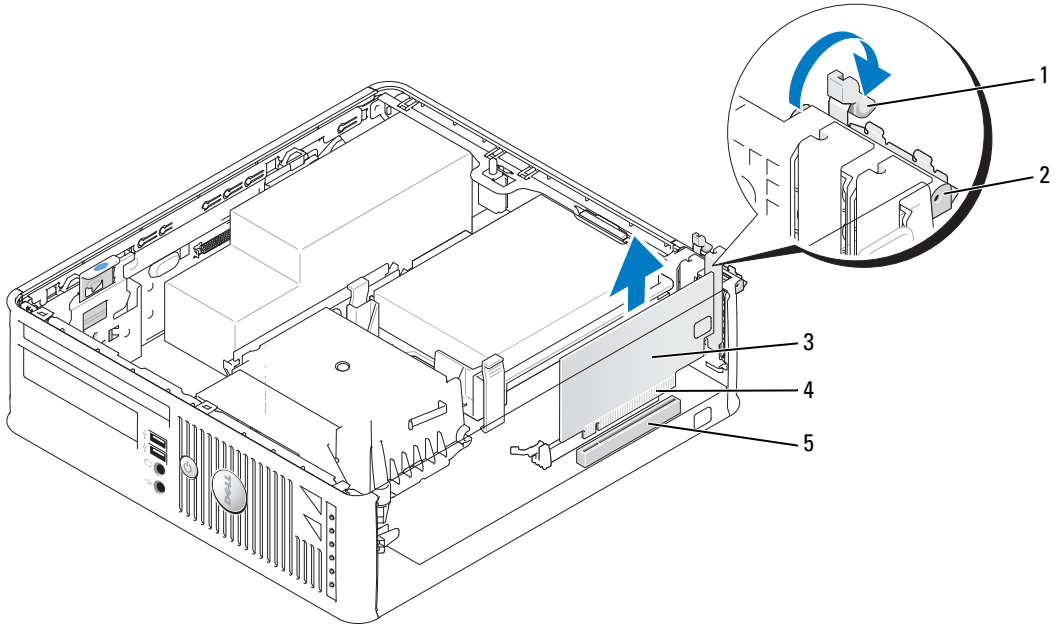
2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

NOTE: For PCI card locations, see "System Board Components" on page 172.

3 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4 If necessary, disconnect any cables connected to the card.

5 Grasp the card by its top corners, and ease it out of its connector.



1	release tab	2	card retention latch	3	PCI card
4	card-edge connector	5	card connector		

6 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

10 Uninstall the card's driver. See the documentation that came with the card for instructions.

11 If you removed a sound card:

a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 280).

b Connect external audio devices to the audio connectors on the back panel of the computer.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

NOTE: See the documentation for the card for information about the card's cable connections.

12 If you removed a network-adapter card connector:

a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 280).

b Connect the network cable to the integrated network connector on the back panel of the computer.

PCI Express and DVI Cards

Your computer supports one low-profile PCI Express x16 card.

If you are replacing a PCI Express card with a different type of PCI Express card, remove the current driver for the card from the operating system. See the documentation that came with the card for information.

Installing a PCI Express x16 Card or DVI Card

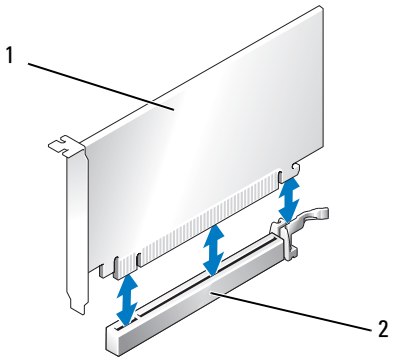
1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).

   NOTE: For PCI card locations, see "System Board Components" on page 172.
3. Gently lift the release tab on the card retention latch from the inside and pivot the latch open.
4. If you are installing a new PCI Express x16 card or DVI card, remove the filler bracket to create a card-slot opening. Then continue with step 5.
5. If you are replacing a PCI Express x16 card or DVI card, remove the card (see "Removing a PCI Express x16 Card or DVI Card" on page 189). If necessary, disconnect any cables connected to the card. Then continue with step 6.
6. Prepare the card for installation.

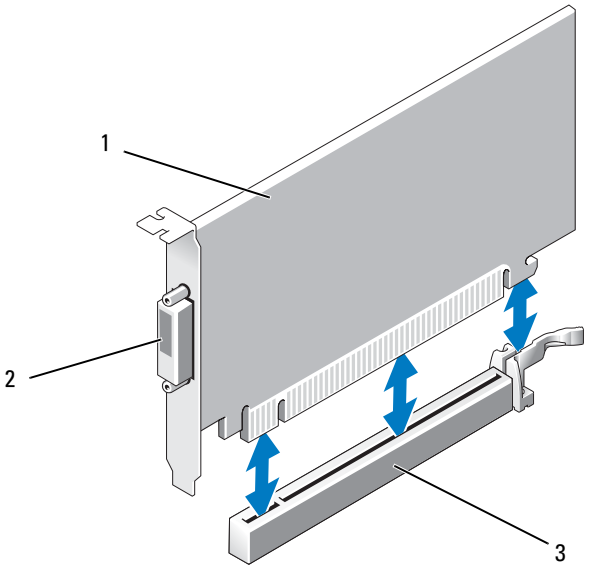
CAUTION: Some network adapters automatically start the computer when they are connected to a network. To guard against electrical shock, be sure to unplug your computer from its electrical outlet before installing any cards.

NOTE: See the documentation that came with the card for information on configuring the card, making internal connections, or customizing it for your computer.

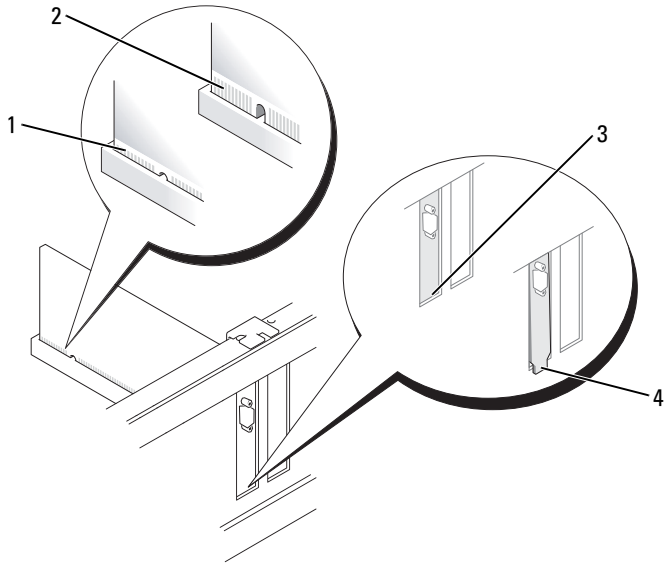
7. Place the card in the connector and press down firmly. Ensure that the card is fully seated in the slot.



1	PCI Express x16 card	2	PCI Express x16 card connector



1	PCI Express x16 DVI-card	2	DVI card connector	3	PCI Express x16 card connector



1 card fully seated 2 card not fully seated 3 bracket within slot

4 bracket caught outside of slot

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

8 Connect any cables that should be attached to the card.

9 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

10 Secure the card(s) by closing the card retention latch and snapping it into place.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

NOTE: See the documentation for the card for information about the card's cable connections.

12 If you installed a sound card:

a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 280).

b Connect external audio devices to the sound card's connectors. Do not connect external audio devices to the line-in connector on the back panel of the computer (see "Back Panel Connectors" on page 167).

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

13 If you installed a network adapter card and want to turn off the integrated network adapter:

a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **Off** (see "System Setup" on page 280).

b Connect the network cable to the network adapter card's connectors. Do not connect the network cable to the integrated network connector on the back panel of the computer.

14 Install any drivers required for the card as described in the card documentation.

Removing a PCI Express x16 Card or DVI Card

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

3 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

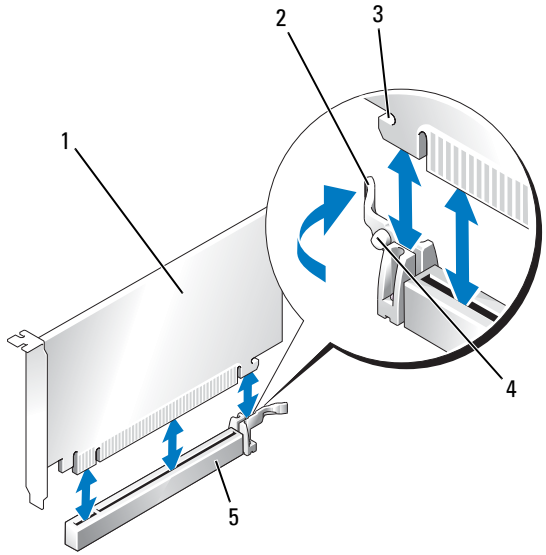
4 If necessary, disconnect any cables connected to the card.

5 Press the lever with your thumb until you release the securing tab.

If you are removing a PCI Express x16 card, go to step 6.

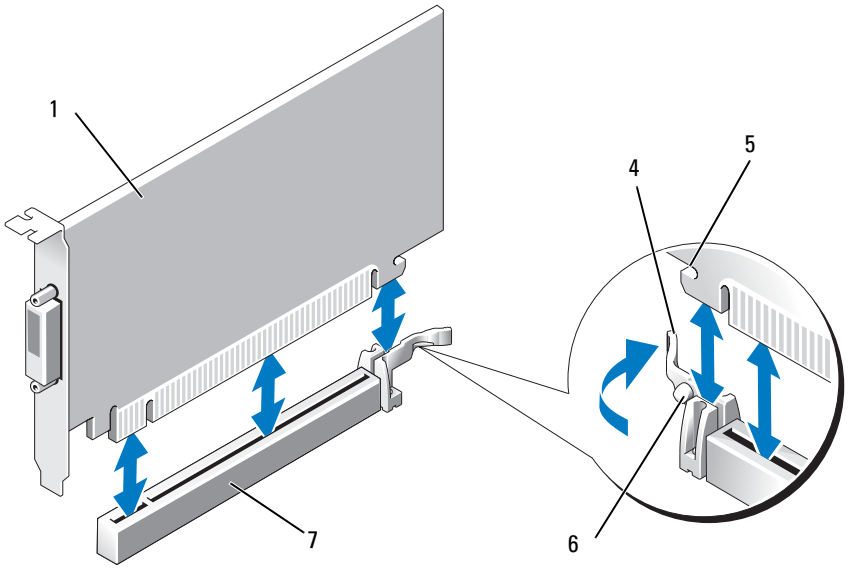
If you are removing a DVI card, go to step 7

6 While pressing the lever, pull the card up and out of the card connector.



1	PCI Express x16 card	2	lever	3	securing slot (not all cards)
4	securing tab	5	PCI Express x16 card connector		

7 While pressing the lever, pull the removal pull tab up and remove the card out of the card connector.



1	PCI Express x16 DVI-card	2	removal pull tab	3	DVI card connector
4	lever	5	securing slot	6	securing tab
7	PCI Express x16 card connector				

8 If you are removing the card permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

9 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

10 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

12 Uninstall the card's driver. See the documentation that came with the card for instructions.

13 If you removed a sound card:

a Enter system setup, select **Integrated Audio** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 280).

b Connect external audio devices to the audio connectors on the back panel of the computer.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

14 If you removed a network-adapter card connector:

a Enter system setup, select **Integrated NIC** from the **Onboard Devices** group, and change the setting to **On** (see "System Setup" on page 280).

b Connect the network cable to the integrated network connector on the back panel of the computer.

PS/2 Serial Port Adapter

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

3 Gently lift the release tab on the card retention latch from the inside and pivot the latch open.

4 Remove the filler bracket (if applicable).

NOTE: See the documentation that came with the adapter for information on configuring the adapter, making internal connections, or customizing it for your computer.

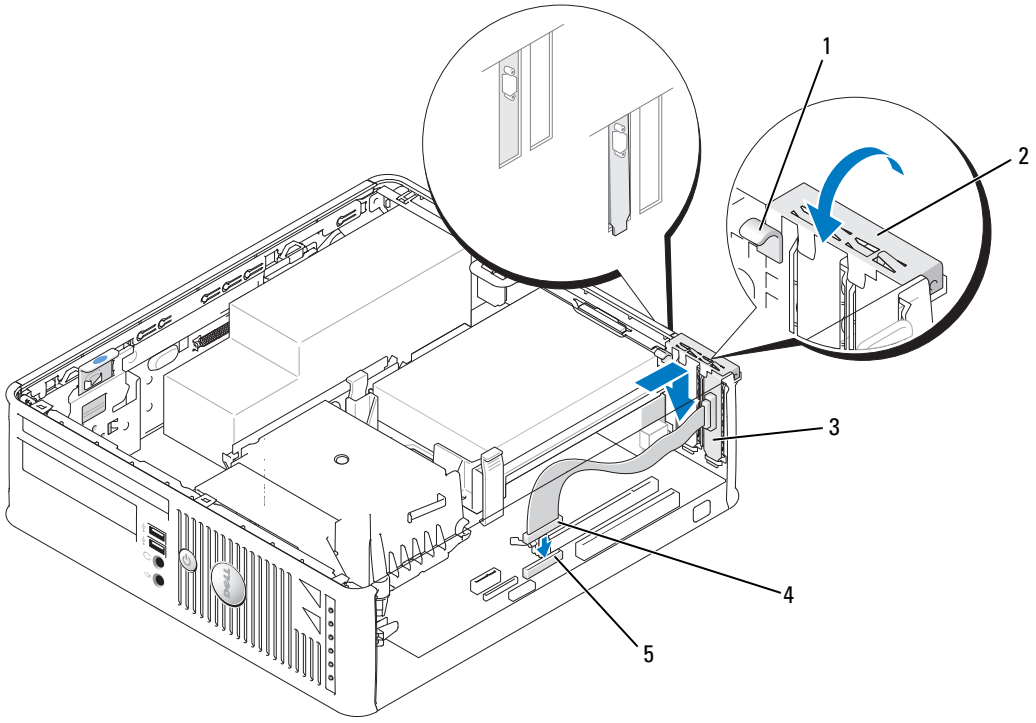
5 Align the PS/2 serial-port adapter bracket in the retention slot and press down firmly. Ensure that the adapter is fully seated in the slot.

6 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

7 Secure the card(s) by closing the card retention latch and snapping it into place.

NOTICE: Do not route card cables over the cards. Cables routed over the cards can prevent the computer cover from closing properly or cause damage to the equipment.



1	release tab	2	adapter retention latch	3	serial port adapter bracket
4	serial port adapter connector	5	serial port adapter system board connector (PS2/SERIAL2)		

8 Connect the adapter cable to the PS/2 serial port adapter connector (PS2/SERIAL2) on the system board (see "System Board Components" on page 172).

NOTE: See the documentation for the PS/2 serial port adapter for information about the cable connections.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317.

Removing a PS/2 Serial Port Adapter

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

3 Gently lift the release tab on the card retention latch from the inside to pivot the latch open. Pivot the latch until it snaps into the open position.

4 Disconnect the PS/2 serial-port cable from the system board (see "System Board Components" on page 172).

5 Ease the PS/2 serial-port adapter bracket out of its retention slot.

6 If you are removing the adapter permanently, install a filler bracket in the empty card-slot opening.

NOTE: Installing filler brackets over empty card-slot openings is necessary to maintain FCC certification of the computer. The brackets keep dust and dirt out of your computer and maintain the airflow that cools your computer.

7 Before you close the card retention mechanism, ensure that:

- The tops of all cards and filler brackets are flush with the alignment bar.
- The notch in the top of the card or filler bracket fits around the alignment guide.

8 Secure any remaining card(s) by closing the card retention latch and snapping it into place.

9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

eSATA

eSATA allows for full SATA data transfer rates (3 GB/sec) between a drive and the chip set, approximately six times the data throughput of USB.

eSATA on your computer also supports *hot-plugging*. Hot-plugging allows for device detection without powering down your computer prior to connecting the device to your computer. When a device is connected, the operating system automatically recognizes the change. However, the computer must be powered down before removal and/or replacement.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

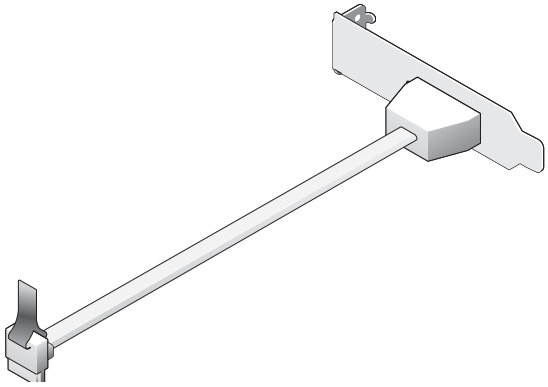
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Installing eSATA

1 Remove the computer cover (see "Removing the Computer Cover" on page 90).

2 Remove the filler panel for the card slot you are using for the eSATA connector.

3 Insert the bracket into the desired eSATA opening.



4 Plug the free end of the eSATA cable into the eSATA connector on the system board (see "System Board Components" on page 172).

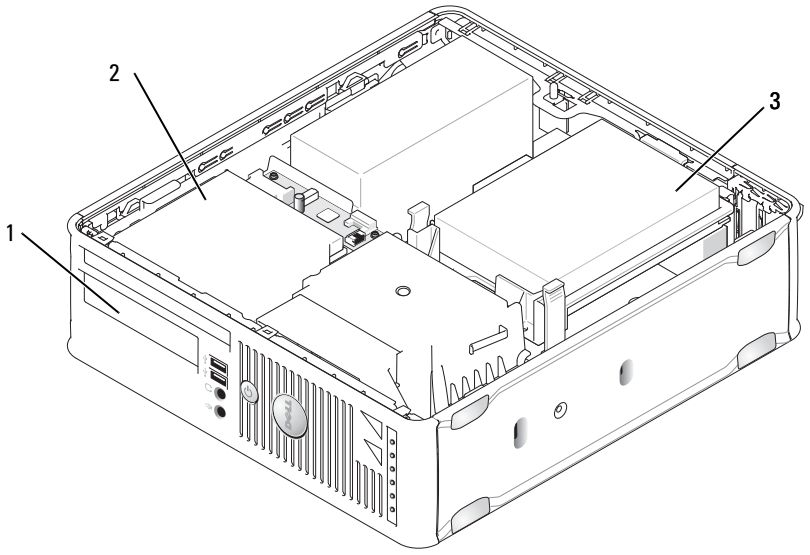
5 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

6 Boot your computer and enter system setup (see "Entering System Setup" on page 280). Use the `esata` option to enable the eSATA drive.

Drives

Your computer supports:

- One SATA (serial ATA) hard drive
- One slimline floppy drive or media card reader
- One SATA slimline optical drive
- One eSATA drive



1 3.5-inch drive bay for optional floppy drive or media card reader

2 slimline optical drive

3 hard drive

General Installation Guidelines

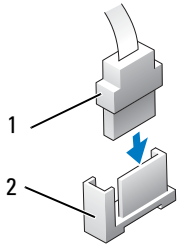
SATA connectors on the system board are labeled SATA0 and SATA1. Hard drives must be connected to SATA0, while any other SATA devices (like an optical drive) must be connected to SATA1. For example, if you have a SATA hard drive and a SATA optical drive, connect the hard drive to the SATA0, and connect the SATA optical drive to the SATA1 connector. (See "System Board Components" on page 172 for the location of the SATA connectors on the system board.)

Connecting Drive Cables

When you install a drive, you connect two cables (a DC power cable and a data interface cable) to the back of the drive.

Data Interface Connectors

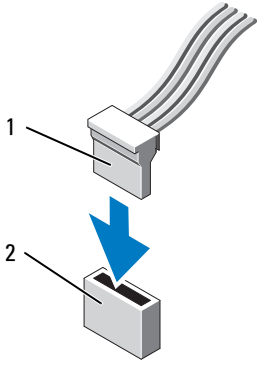
Serial ATA (SATA) Connector



1 data interface cable connector

2 data interface connector

Power Cable Connectors



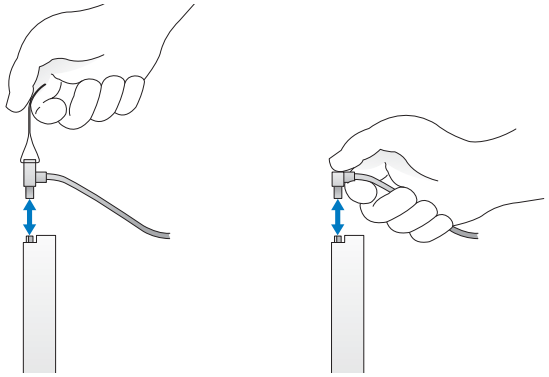
1 power cable

2 power input connector

Connecting and Disconnecting Drive Cables

When removing an cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end.



Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

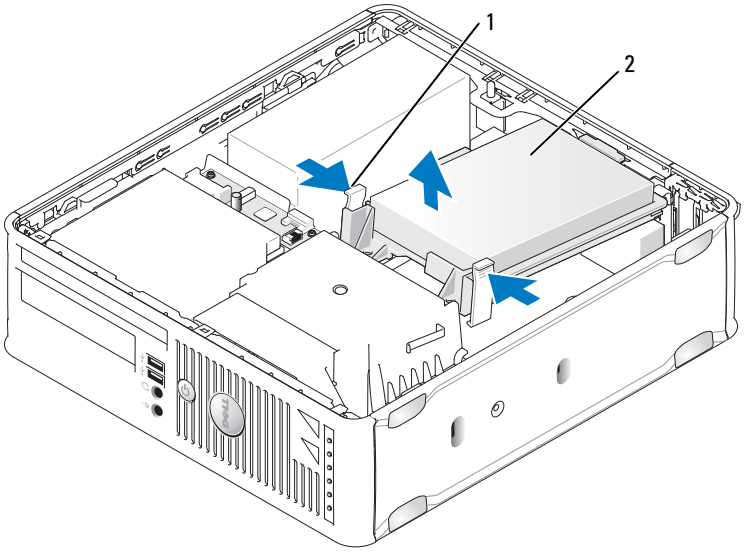
NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Removing a Hard Drive

1. If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.
2. Check the documentation for the drive to verify that it is configured for your computer.
3. Follow the procedures in "Before You Begin" on page 21.
4. Remove the computer cover (see "Removing the Computer Cover" on page 168).
5. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
6. Press in on the two blue securing tabs on each side of the drive and slide the drive up and out of the computer.

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

7. Lift the drive out of the computer, careful not to pull the cables still attached to it.

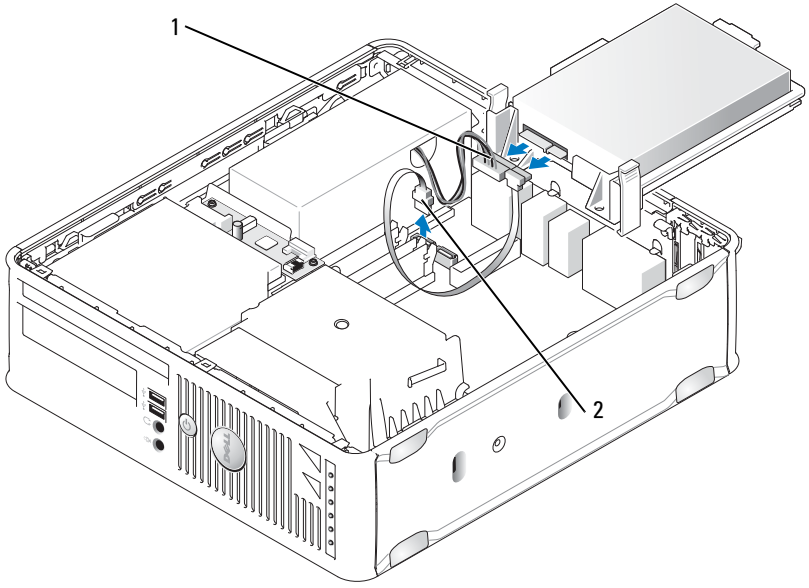


1 securing tabs (2)

2 hard drive

8 Disconnect the power and data cable from the drive.

9 Disconnect the hard drive fan cable from the system board.



1 power cable

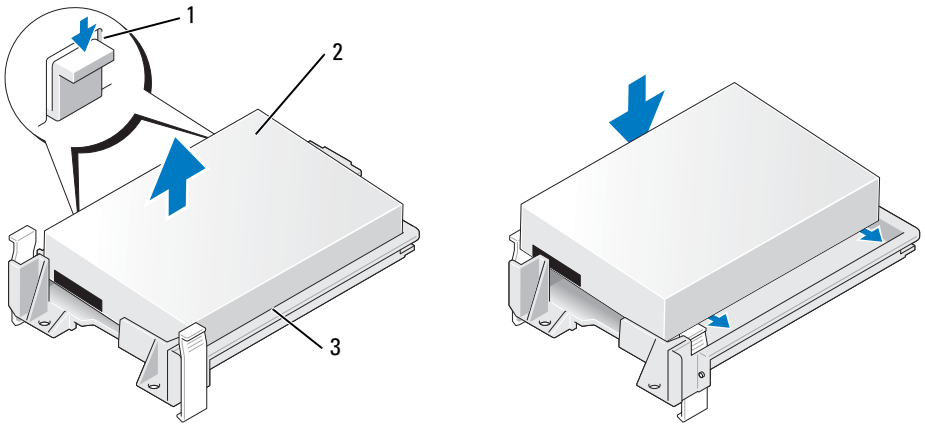
2 SATA data cable

Installing a Hard Drive

1. Check the documentation for the drive to verify that it is configured for your computer.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

2. Unpack the replacement hard drive, and prepare it for installation.
3. If your replacement hard drive does not have the plastic drive bracket attached, remove the bracket from the existing drive by unsnapping it from the drive.



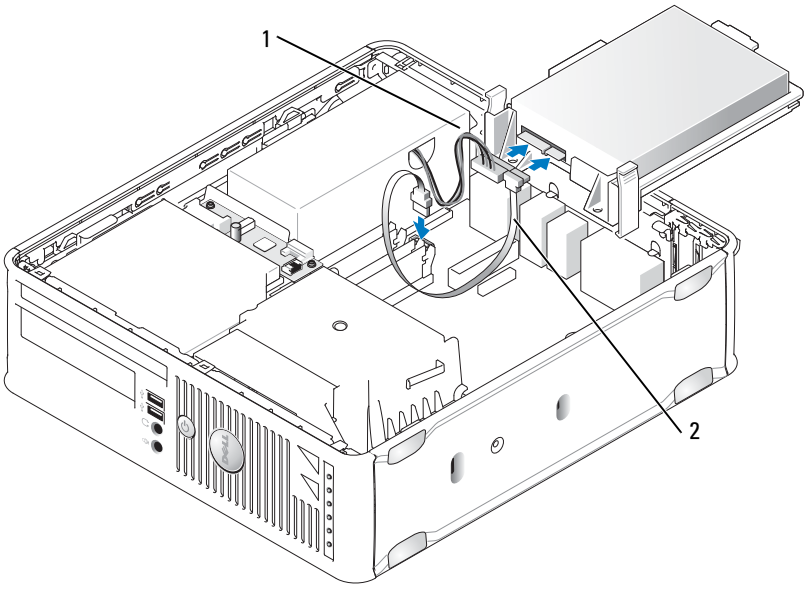
1 release tabs (2)

2 hard drive

3 hard drive bracket

4 Connect the hard drive fan cable to the system board.

5 Connect the power and data cables to the drive.

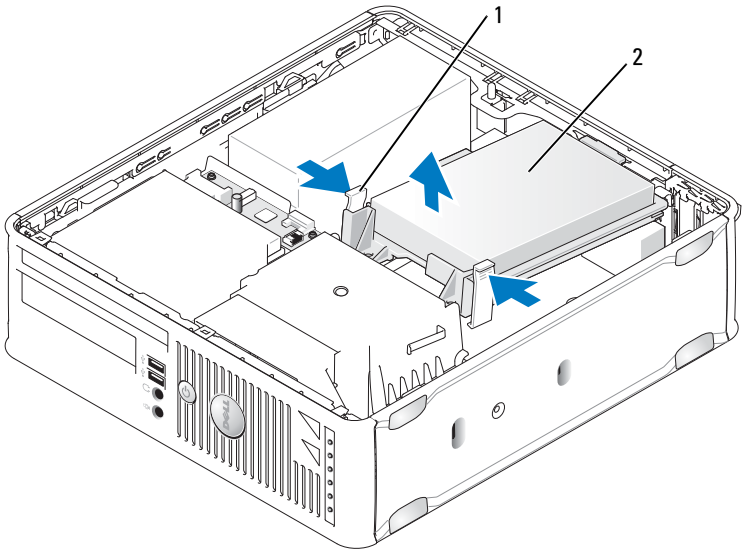


1 power cable

2 SATA data cable

6 Check all connectors to ensure that they are properly cabled and firmly seated.

7 Gently position the drive until it clicks into place.



1 release tabs (2)

2 hard drive

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

9 If the drive you just installed is the primary drive, insert bootable media into your boot drive.

10 Turn on the computer.

11 Enter system setup, and update the SATA port option under the Drives option list (see "Entering System Setup" on page 280).

12 Exit system setup, and reboot the computer.

13 Partition and logically format your drive.

NOTE: For instructions, see the documentation that came with your operating system.

14 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

15 Install your operating system on the hard drive.

NOTE: For instructions, see the documentation that came with your operating system.

Replacing a Hard Drive Fan

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

3 Remove the hard drive (see "Removing a Hard Drive" on page 197).

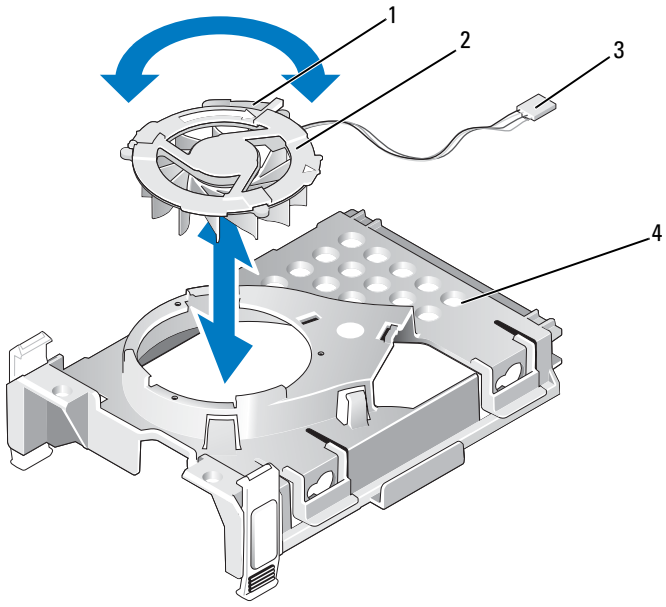
4 Turn the hard drive upside down, so that the hard drive fan is visible in the bottom of the drive bracket.

5 To remove the hard drive fan:

a Lift the release tab on the back panel of the fan.

b Rotate the fan in the opposite direction from that indicated by the arrow on the back panel of the fan.

c Lift to remove the fan and its back panel from the hard drive bracket.



1 fan release tab

2 fan with fan back panel

3 power cable

4 hard drive bracket

6 To replace the hard drive fan:

a Turn the fan upside-down, so that its backing faces up and align the triangle on the fan's back panel with the corresponding triangle on the back of the hard drive bracket.

b Rotate the fan and its backing in the direction of the arrow on the fan's back panel.

7 Install the hard drive (see "Installing a Hard Drive" on page 199).

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Optical Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

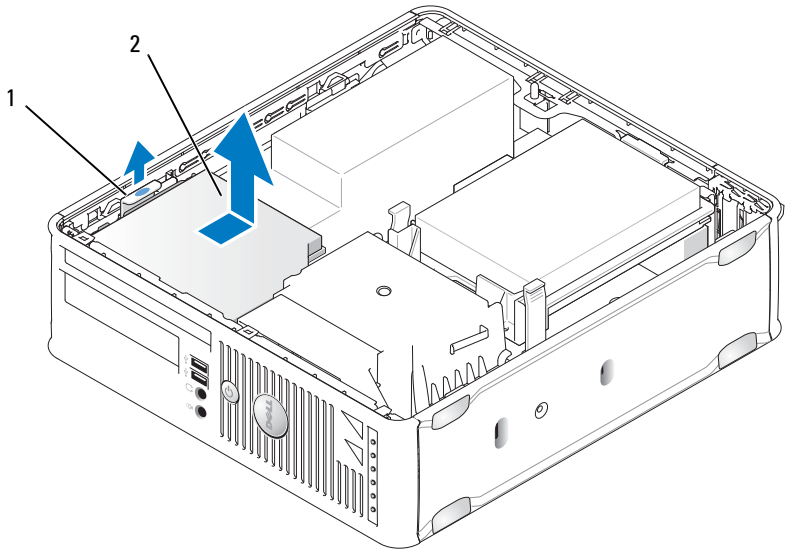
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing an Optical Drive

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

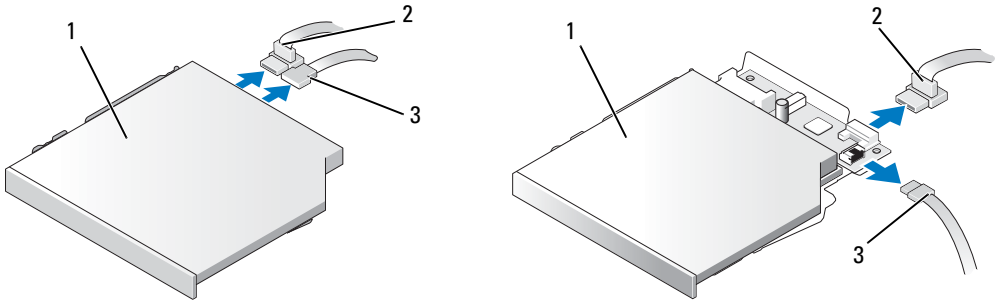
4. Pull up on the drive release latch and slide the drive towards the back of the computer. Then lift up to remove the drive from the computer.



1 drive release latch 2 optical drive

5. Disconnect the power and data cable from the back of the drive.

NOTE: The power and data cables for the slimline optical drive installed in your computer are configured in one of two ways as illustrated below.



1 optical drive 2 data cable 3 power cable

6 Remove the drive and replace the computer cover (see "Replacing the Computer Cover" on page 317).

Installing an Optical Drive

1 Unpack the drive and prepare it for installation.

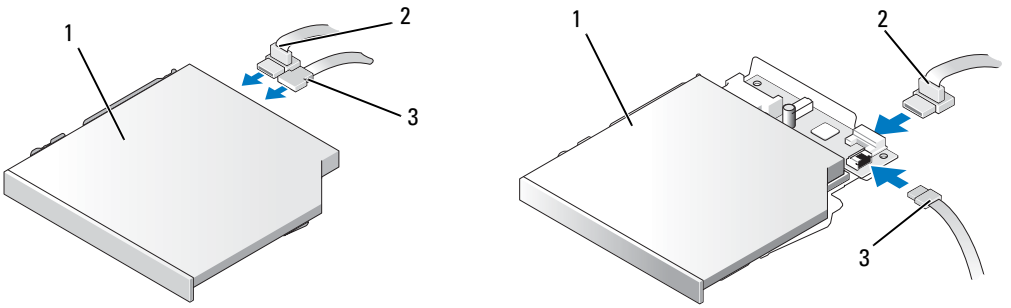
2 Check the documentation that accompanied the drive to verify that the drive is configured for your computer.

3 Follow the procedures in "Before You Begin" on page 21.

4 Remove the computer cover (see "Removing the Computer Cover" on page 168).

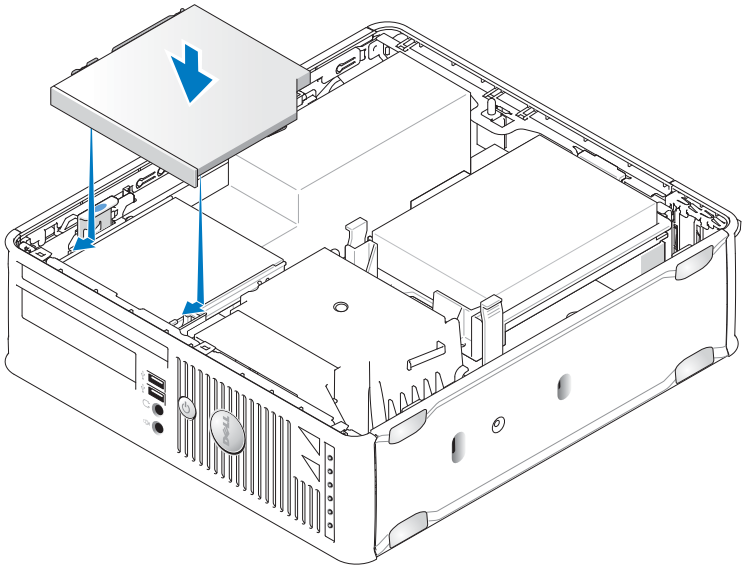
5 Connect the power and data cable to the drive.

NOTE: The power and data cables for the slimline optical drive installed in your computer are configured in one of two ways as illustrated below.



1 optical drive 2 data cable 3 power cable

6 Gently position the drive until it clicks into place.



7 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

8 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

9 See the documentation that came with the drive for instructions on installing any software required for drive operation.

10 Enter system setup and select the appropriate **Drive** option (see "System Setup" on page 280).

11 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Floppy Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing a Floppy Drive

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

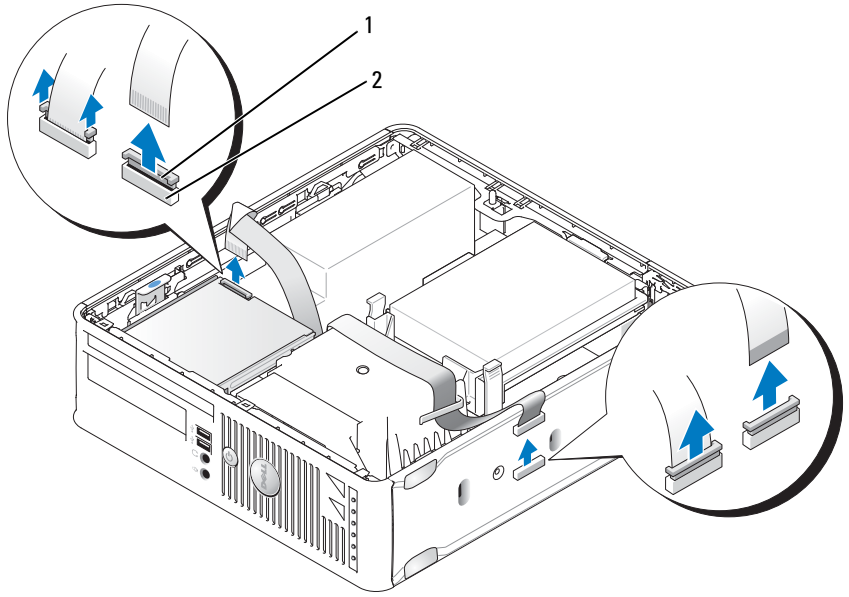
3 Lay the computer on its side so that the system board is on the bottom of the inside of the computer.

4 Remove the optical drive and carefully set it aside (see "Optical Drive" on page 204).

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

5 If you are removing a floppy drive, pull up the cable release tab to unlock it.

6 Gently lift the data cable from the floppy data cable edge connector.



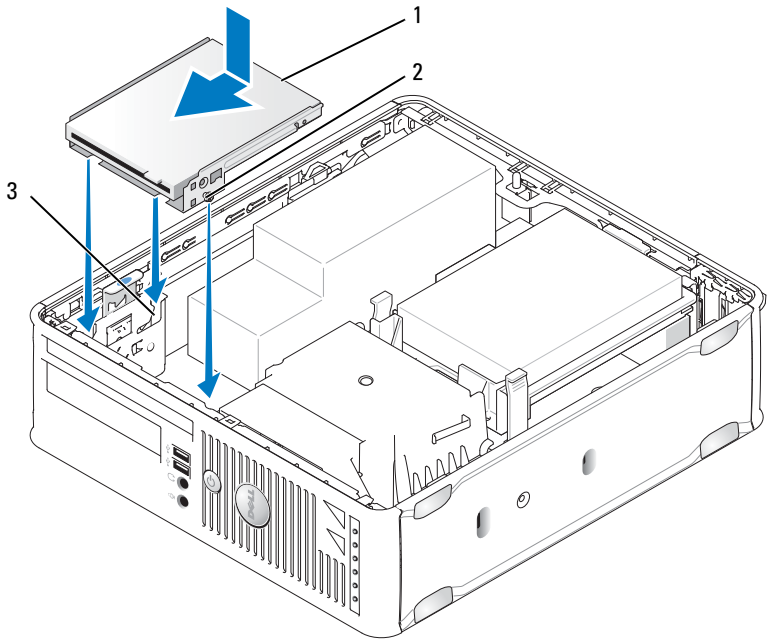
1 cable release tab 2 data cable edge connector

7 Disconnect the data cable from the system board.

8 Pull up on the drive release latch and slide the floppy drive or media card reader towards the back of the computer. Then lift up to remove the drive.

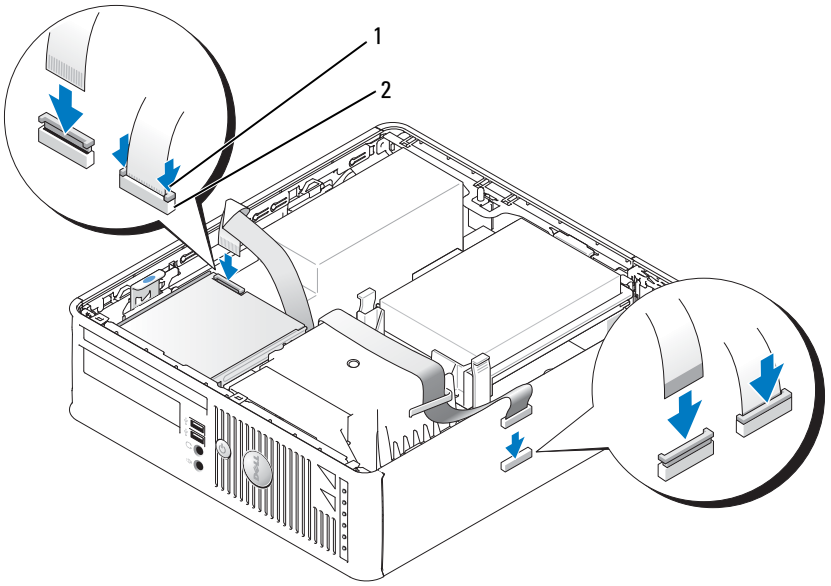
9 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Installing a Floppy Drive



1 floppy drive 2 screws (3) 3 bracket slots (3)

1. If you are:
   - Installing a new floppy drive, remove the drive panel insert
   - Replacing a drive, remove the floppy drive (see "Removing a Floppy Drive" on page 206).
2. Align the screws on the drive with the bracket slots in the computer, and gently position the drive until it clicks into place.
3. Insert the data cable into the cable release tab on the floppy drive and press down on the tab until it clicks to lock it in place.
4. Insert the data cable into the connector on the system board.



1	cable release tab	2	floppy drive data cable edge connector

5 Replace the optical drive (see "Optical Drive" on page 204).

6 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

7 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

8 Enter system setup and use the **Diskette Drive** option to enable your new floppy drive (see "System Setup" on page 280).

See the documentation that came with the drive for instructions on installing any software required for drive operation.

9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Media Card Reader

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

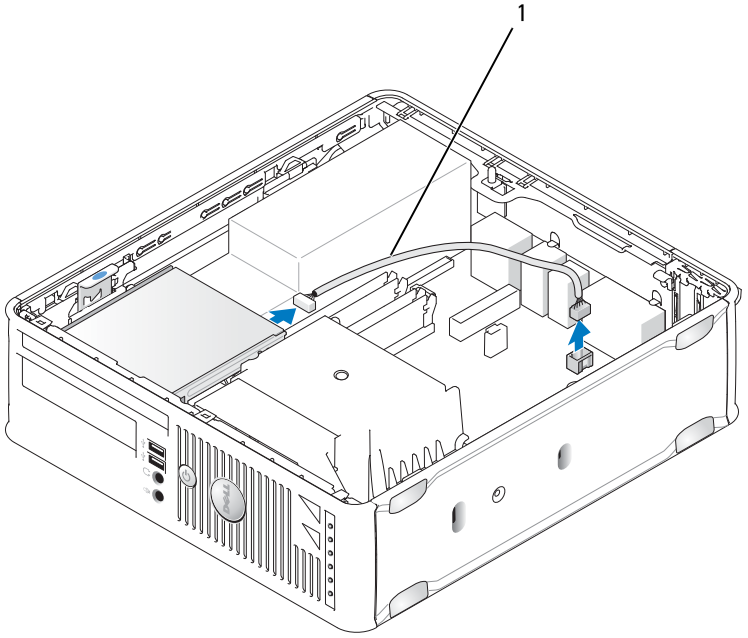
CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

Removing a Media Card Reader

1. Follow the procedures in "Before You Begin" on page 21.
2. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
3. Remove the computer cover (see "Removing the Computer Cover" on page 168).
4. Remove the optical drive and carefully set it aside (see "Optical Drive" on page 204).

NOTICE: Do not pull the drive out of the computer by the drive cables. Doing so may cause damage to cables and the cable connectors.

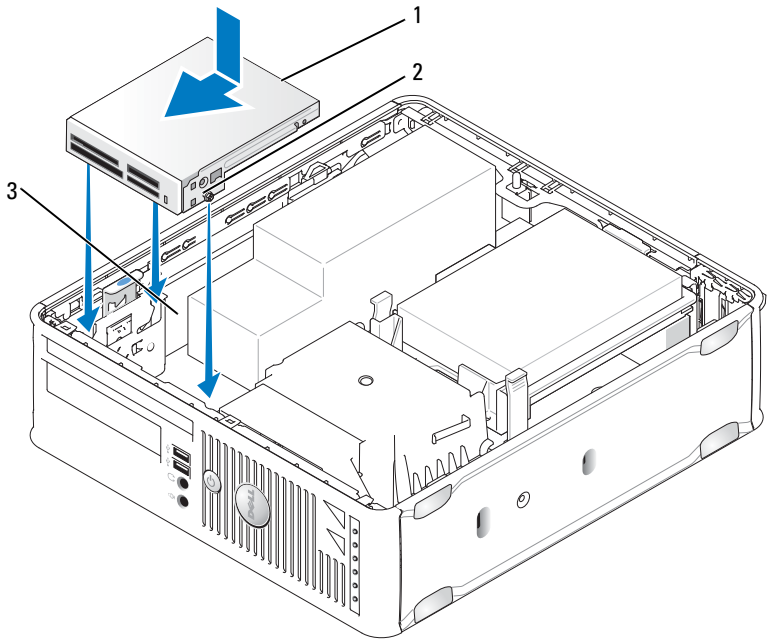
5. Remove the cable from the media card reader connector.
6. Remove the hard drive (see "Removing a Hard Drive" on page 197).
7. Disconnect the cable.



1 media card reader data cable

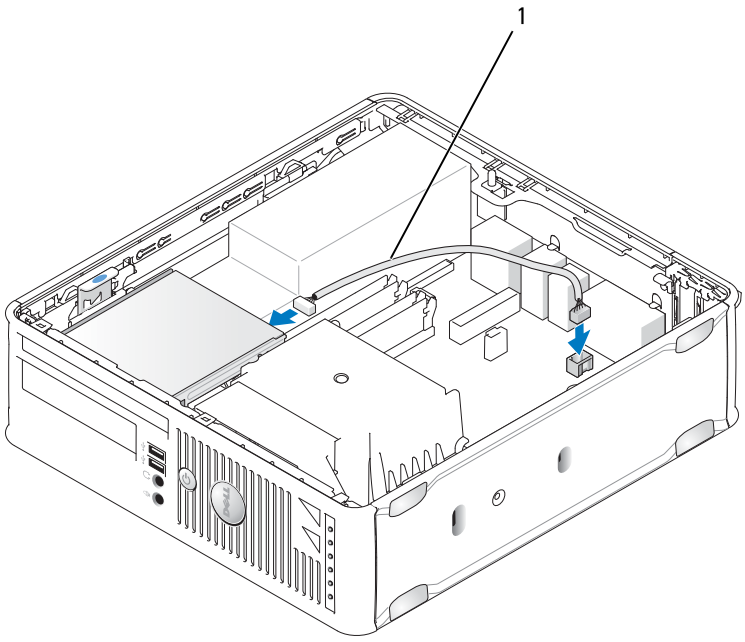
8. Pull up on the drive release latch and slide the media card reader towards the back of the computer. Then lift up to remove the media card reader from the computer.
9. Replace the hard drive (see "Installing a Hard Drive" on page 199).
10. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

Replacing a Media Card Reader



1 media card reader 2 screws (3) 3 bracket rails (3)

1. If you are replacing a media card reader, remove the installed media card reader (see "Removing a Media Card Reader" on page 210), and skip to step 3.
2. If you are installing a new media card reader, perform the following steps before continuing to step 3:
   a. Follow the procedures in "Before You Begin" on page 21.
   b. Remove the computer cover (see "Removing the Computer Cover" on page 168).
   c. Lay the computer on its side so that the system board is on the bottom of the inside of the computer.
   d. Remove the drive panel insert.
3. Align the screws on the media card reader with the bracket slots in the computer, and gently position the drive until it clicks into place.
4. Connect the cable into the connectors on the media card reader and system board.



1 media card reader data cable

5 Replace the optical drive (see "Optical Drive" on page 204).

6 Check all cable connections, and fold cables out of the way to provide airflow for the fan and cooling vents.

7 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

8 See the documentation that came with the drive for instructions on installing any software required for drive operation.

9 Verify that your computer works correctly by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Processor

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

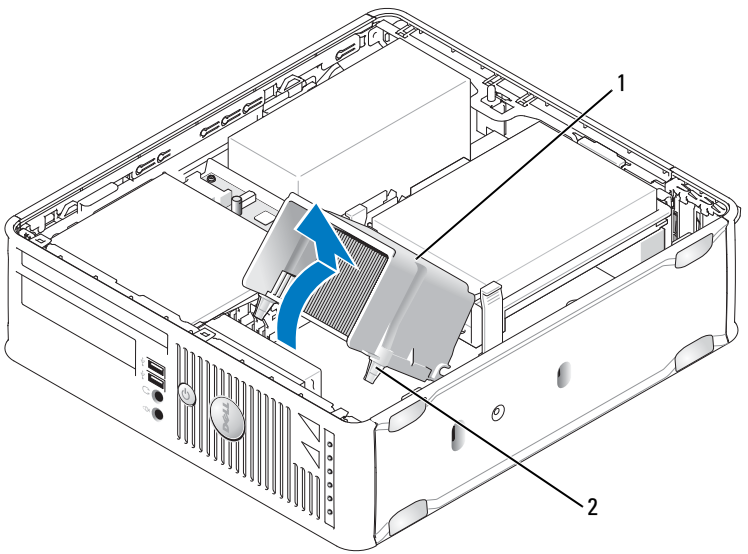
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

Removing the Processor

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. Loosen the captive screw on each side of the heat sink assembly.

CAUTION: Despite having a plastic shield, the heat sink assembly may be very hot during normal operation. Be sure that it has had sufficient time to cool before you touch it.

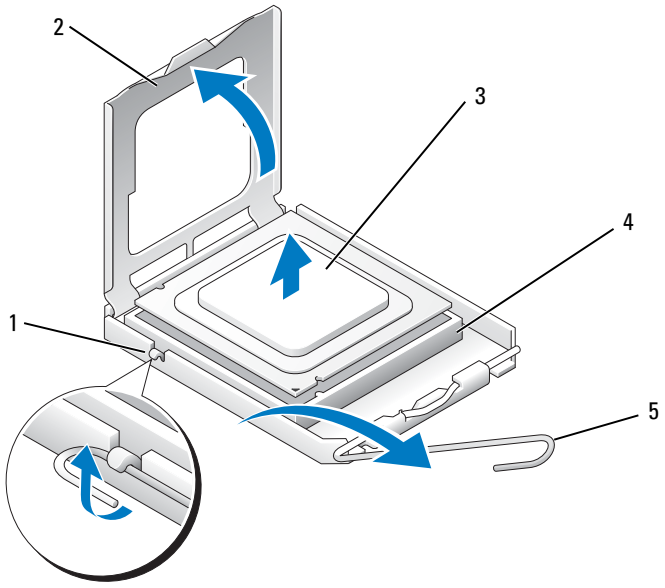
4. Rotate the heat sink assembly upward, and remove the assembly from the computer. Lay the heat sink down on its top, with the thermal grease facing upward.



1 heat sink assembly
2 captive screws in housing (2)

NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

5 Open the processor cover by sliding the release lever from under the center cover latch on the socket. Then, pull the lever back to release the processor.



1 center cover latch
2 processor cover
3 processor
4 socket
5 release lever

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

6 Gently remove the processor from the socket.

Leave the release lever extended in the release position so that the socket is ready for the new processor.

Installing the Processor

NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" on page 168).

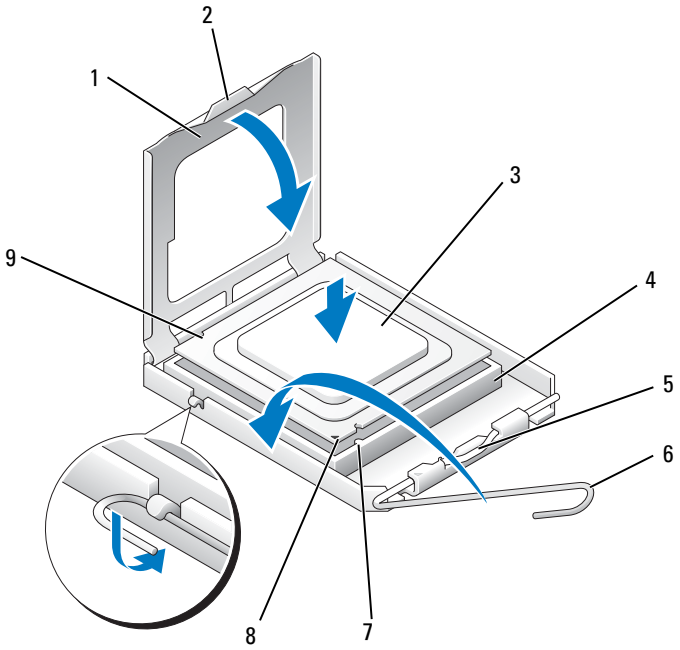
3 Unpack the new processor, being careful not to touch the underside of the processor.

NOTICE: You must position the processor correctly in the socket to avoid permanent damage to the processor and the computer when you turn on the computer.

4 If the release lever on the socket is not fully extended, move it to that position.

5 Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

6 Align the pin-1 corners of the processor and socket.



1	processor cover	6	release lever
2	tab	7	front alignment-notch
3	processor	8	socket and processor pin-1 indicator
4	processor socket	9	rear alignment-notch
5	center cover latch		

NOTICE: To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

7 Set the processor lightly in the socket and ensure that the processor is positioned correctly.

8 When the processor is fully seated in the socket, close the processor cover.

Ensure that the tab on the processor cover is positioned underneath the center cover latch on the socket.

9 Pivot the socket release lever back toward the socket and snap it into place to secure the processor.

10 Clean the thermal grease from the bottom of the heat sink.

NOTICE: Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

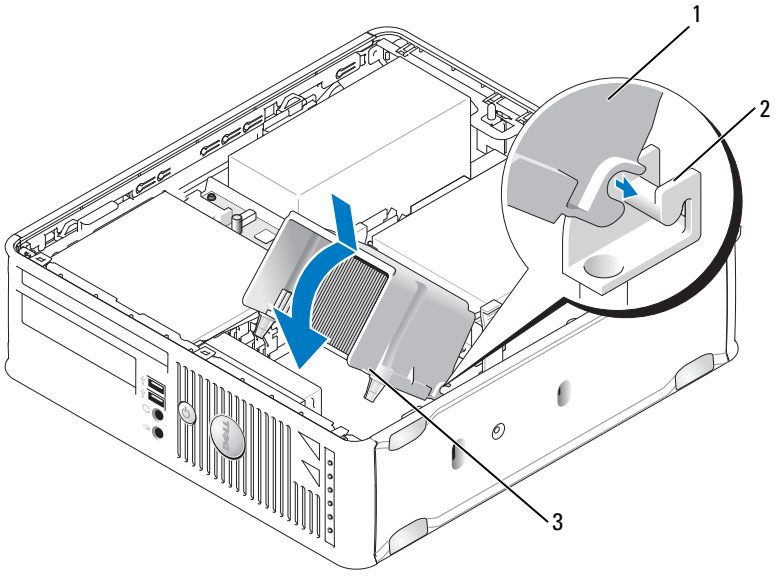
11 Apply the new thermal grease to the top of the processor.

12 Install the heat sink assembly:

a Place the heat sink assembly back onto the heat-sink assembly bracket.

b Rotate the heat sink assembly down towards the computer base and tighten the two captive screws.

NOTICE: Ensure that the heat sink is correctly seated and secure.



1 heat sink assembly
2 heat-sink assembly bracket
3 captive screw in housing (2)

13 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

I/O Panel

Removing the I/O Panel

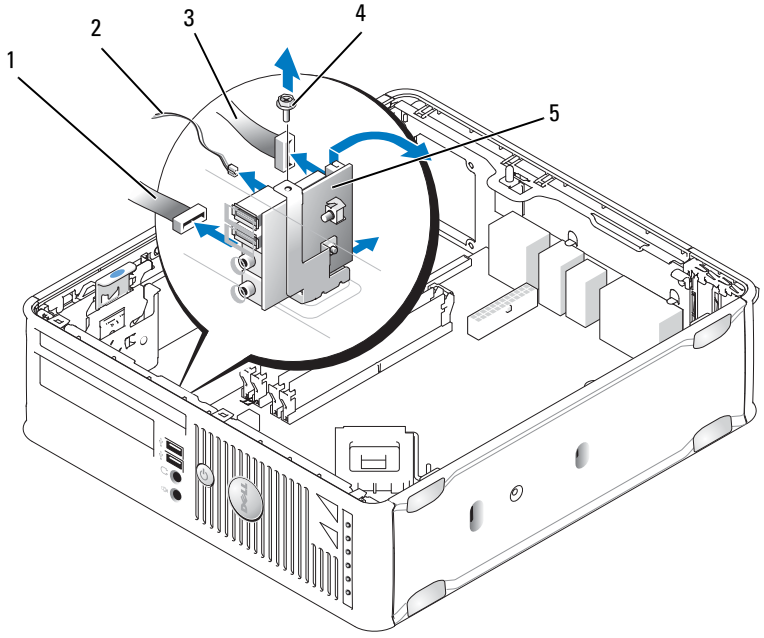
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the computer cover.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. Remove the optical drive and floppy drive from the drive bays, if installed (see "Drives" on page 195).
4. Remove the hard drive (see "Removing a Hard Drive" on page 197).
5. Remove the processor heat sink (see "Processor" on page 213).

   NOTE: You'll also have to remove the heat sink base.
6. Remove the system board.
   - Unscrew all retaining screws on the system board (see "Small Form Factor System Board Screws" on page 310).
   - Gently lift the system board out of the chassis.
7. Remove the front fan:
   Press the tab that secures the fan to the interior base of the computer and lift the fan from the computer; set the fan aside in the chassis.
8. Remove cables from the IO panel.

   Note the routing of the cables as you lay them aside, so that you can replace them correctly.



1 LED board
2 air temperature sensor
3 I/O cable connector
4 mounting screw
5 I/O panel

9 Remove cables from the system board.

10 From inside the computer cover, remove the mounting screw that secures the I/O panel to the computer.

11 Ease the I/O panel back and forth to release its circular tabs from the two holes in the chassis that secure it.

12 Remove the I/O panel from the computer.

Replacing the I/O Panel

To replace the I/O panel, follow the removal procedures in the reverse order.

NOTE: Use the guides on the I/O panel bracket to help position the I/O panel in place and use the notch on the I/O panel bracket to help seat the card.

Power Supply

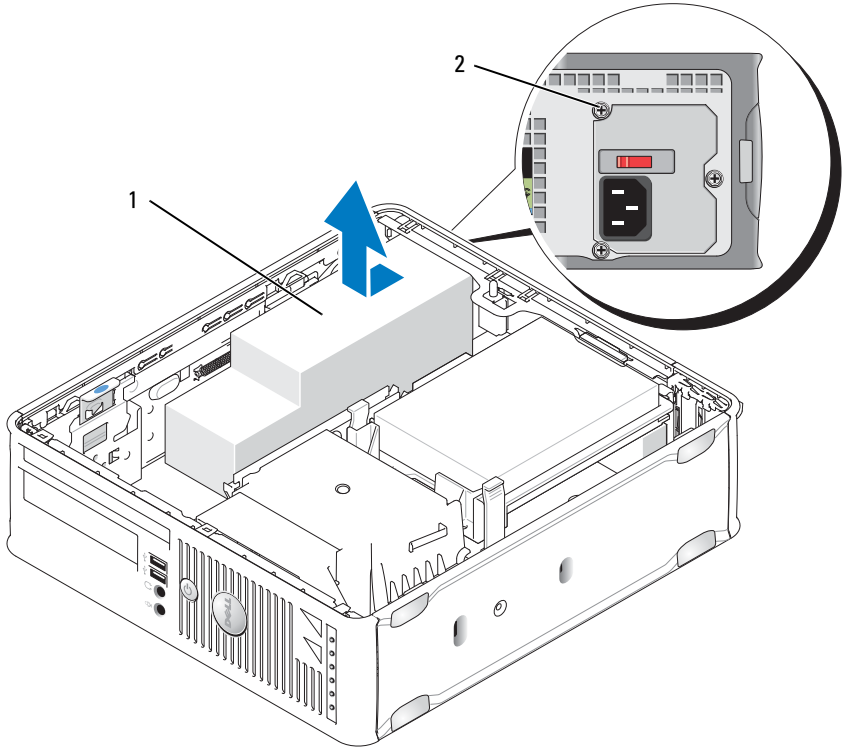
Replacing the Power Supply

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. If installed, remove the optical drive (see "Removing an Optical Drive" on page 204).
4. If installed, remove the floppy drive or media card reader (see "Floppy Drive" on page 206).
5. Disconnect the DC power cables from the system board and the drives.

   NOTE: Remember the routing of the DC power cables underneath the tabs in the computer frame as you remove them from the system board and drives. You must route these cables properly when you replace them to prevent their being pinched or crimped.
6. Remove the three screws that attach the power supply to the computer chassis.



1 power supply 2 mounting screw

7 Slide the power supply toward the front of the computer approximately 1 inch.

8 Lift the power supply up and out of the computer.

9 Slide the replacement power supply into place.

10 Replace the screws that secure the power supply to the back of the computer chassis.

11 Reconnect the DC power cables to the system board and drives (see "System Board Components" on page 172 for connector locations).

12 Replace the floppy drive or media card reader (see "Installing a Floppy Drive" on page 208).

13 Replace the optical drive (see "Installing an Optical Drive" on page 205).

14 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

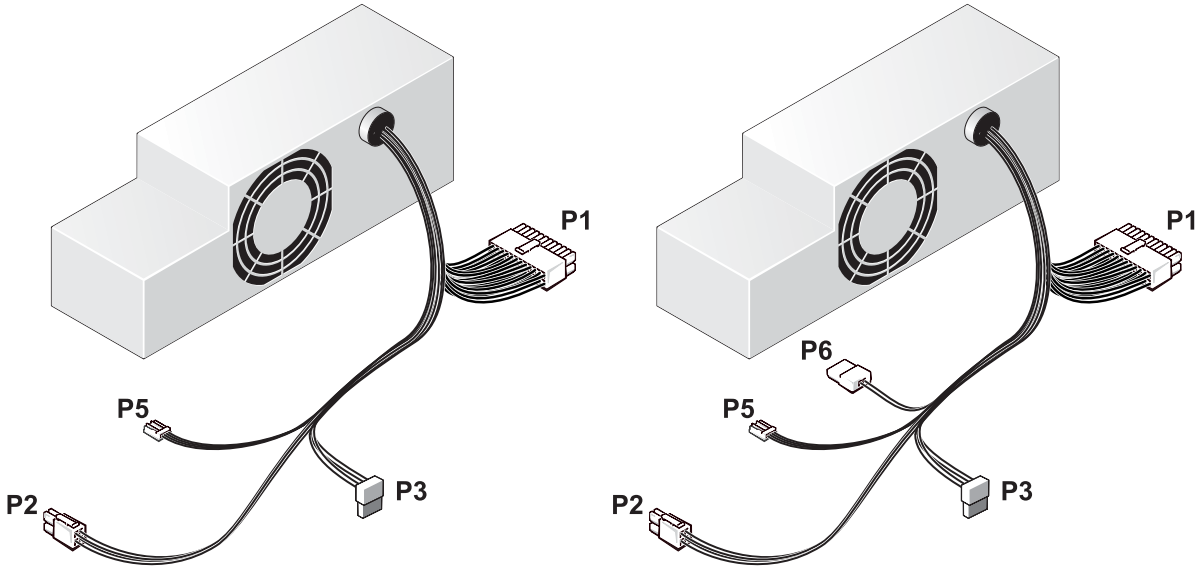
15 Connect the AC power cable to the power supply AC power connector.

NOTICE: To connect a network cable, plug the cable into the network wall jack and then plug it into the computer.

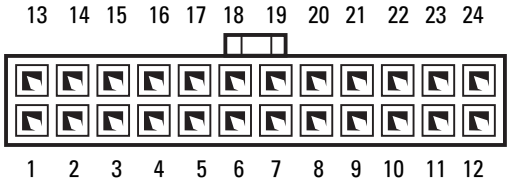
16 Connect your computer and devices to electrical outlets, and turn them on.

DC Power Connectors

NOTE: The power supply installed in your computer is one of two options as illustrated below.



DC Power Connector P1



Pin Number	Signal Name	18-AWG Wire
1	+3.3 VDC	Orange
2	+3.3 VDC	Orange
3	GND	Black
4	VCC (+5 V)	Red
5	GND	Black
6	VCC (+5 V)	Red

Pin Number	Signal Name	18-AWG Wire
7	GND	Black
8	PS_PWRGOOD*	Gray
9	P5AUX	Purple
10	V_12P0_DIG	Yellow
11	V_12P0_DIG	Yellow
12	+3.3 V	Orange
13 (optional)	+3.3V	Orange
14	-12 V*	Blue
15	GND	Black
16	PWR_PS_ON	Green
17	GND	Black
18	GND	Black
19	GND	Black
20	NC	NC
21	VCC (+5V)	Red
22	VCC (+5V)	Red

Pin Number	Signal Name	18-AWG Wire
23	VCC (+5V)	Red
24	GND	Black

*Use 22-AWG wire instead of 18-AWG wire.

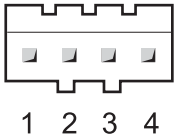
DC Power Connector P2

Pin Number	Signal Name	18-AWG Wire
1	GND	Black
2	GND	Black
3	+12 VDC	Yellow
4	+12 VDC	Yellow

DC Power Connectors P3

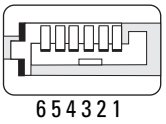
Pin Number	Signal Name	18-AWG Wire
1	+3.3 VDC	Orange
2	GND	Black
3	+5 VDC	Red
4	GND	Black
5	+12 VDC	Yellow

DC Power Connector P5



Pin Number	Signal Name	24-AWG Wire
1	GND	Black
2	+5 VDC	Red
3	NA	NA
4	+3.3 VDC	Orange

DC Power Connector P6



Pin Number	Signal Name	24-AWG Wire
1	NC	NC
2	+5 VDC	Red
3	+5 VDC	Red
4	NC	NC
5	GND	Black
6	GND	Black

Speakers

Installing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 168).
3. Attach the speaker to the system fan.
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 168).
3. Disconnect the cables from the system board.
4. Remove the speaker from the system fan.
5. Replace the computer cover.
6. Turn on power to the computer.

Ultra Small Form Factor Computer

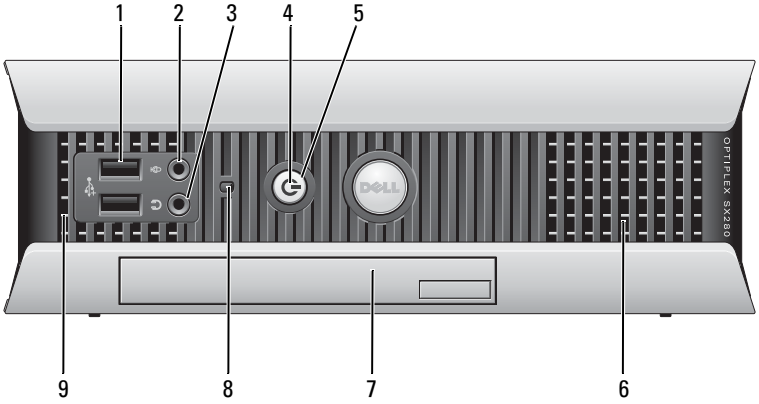
About Your Ultra Small Form Factor Computer

NOTICE: Do not place your monitor on the computer. Use a monitor stand.

NOTICE: When setting up your computer, secure all cables toward the back of your work area to prevent the cables from being pulled, tangled, or stepped on.

NOTE: If you want to orient your computer under a desk top or on a wall surface, use the optional wall-mount bracket. To order this bracket, contact Dell (see "Getting Help" on page 365).

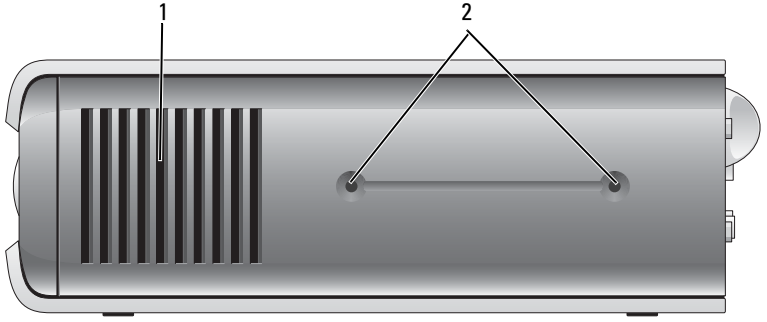
Front View



1	USB connectors (2)	Use the front USB connectors for devices that you connect occasionally, such as joysticks or cameras, or for bootable USB devices (see "System Setup" on page 280 for more information about booting to a USB device). It is recommended that you use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
2	headphone connector	Use the headphone connector to attach headphones and most kinds of speakers.
3	microphone connector	Use the microphone connector to attach a microphone.

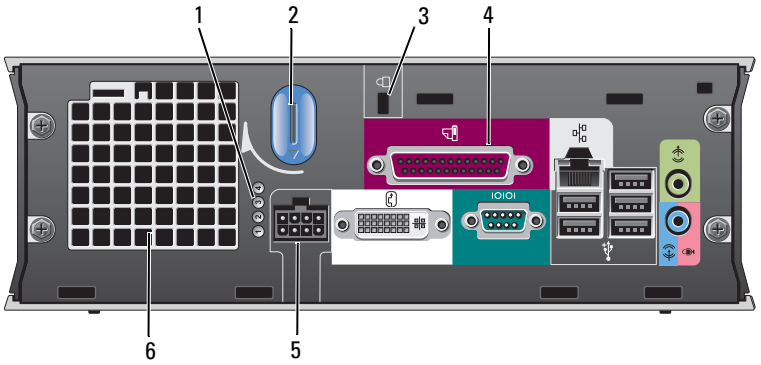
4	power light	The power light illuminates and blinks or remains solid to indicate different states: • No light — The computer is turned off. • Steady green — The computer is in a normal operating state. • Blinking green — The computer is in a power-saving mode. • Blinking or solid yellow — See "Power Problems" on page 339. To exit from a power-saving mode, press the power button or use the keyboard or the mouse if it is configured as a wake device in the Windows Device Manager. For more information about sleep modes and exiting from a power-saving mode, see "Power Management for Windows XP and Windows Vista" on page 292. See "System Lights" on page 345 for a description of light codes that can help you troubleshoot problems with your computer.
5	power button	Press this button to turn on the computer. **NOTICE:** To avoid losing data, do not turn off the computer by pressing the power button. Instead, perform an operating system shutdown. See "Turning Off Your Computer" on page 21 for more information.
6	vents	The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.
7	module bay	Install a D-module optical drive, second hard drive, or floppy drive in the module bay.
8	hard drive access light	The hard drive access light is on when the computer reads data from or writes data to the hard drive. The light might also be on when devices such as your CD player are operating.
9	vents	The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.

Side View



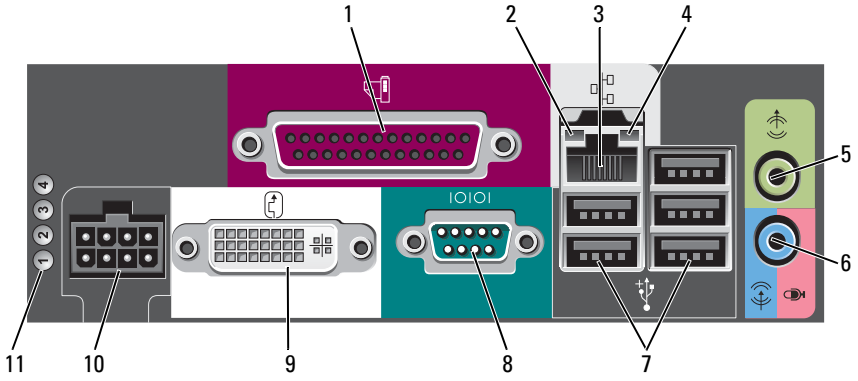
1	vents	The vents located on each side of the computer help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.
2	mounting holes	For mounting optional stand.

Back View



1	diagnostic lights	See "Diagnostic Lights" on page 347 for a description of light codes that can help you troubleshoot problems with your computer.
2	computer cover release knob	Rotate this knob in a clockwise direction to remove the cover.
3	security cable slot	See "Padlock Ring and Security Cable Slot" on page 274 for information about using the security cable slot.
4	back panel connectors	See "Back Panel Connectors" on page 229 for a description of the connectors for your computer.
5	power connector	Insert the AC power adapter plug.
6	vents	The vents help prevent your computer from overheating. To ensure proper ventilation, do not block these cooling vents.

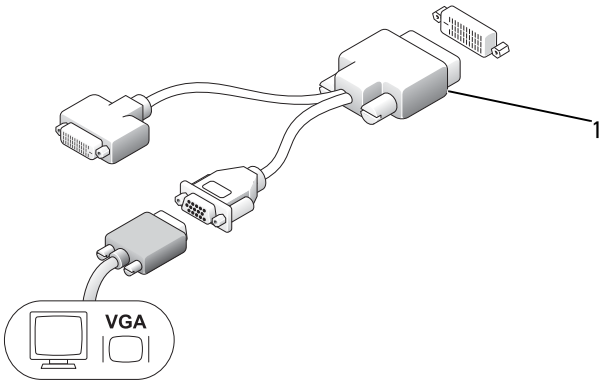
Back Panel Connectors



1	parallel connector	Connect a parallel device, such as a printer, to the parallel connector. If you have a USB printer, plug it into a USB connector.
2	link integrity light	• Green — A good connection exists between a 10-Mbps network and the computer. • Orange — A good connection exists between a 100-Mbps network and the computer. • Yellow — A good connection exists between a 1000-Mbps (1-Gbps) network and the computer. • Off — The computer is not detecting a physical connection to the network or the network controller is turned off in system setup.
3	network adapter	To attach your computer to a network or broadband device, connect one end of a network cable to either a network jack or your network or broadband device. Connect the other end of the network cable to the network adapter connector on the back panel of your computer. A click indicates that the network cable has been securely attached. **NOTE:** Do not plug a telephone cable into the network connector. It is recommended that you use Category 5 wiring and connectors for your network. If you must use Category 3 wiring, force the network speed to 10 Mbps to ensure reliable operation.
4	network activity light	The amber light flashes when the computer is transmitting or receiving network data. A high volume of network traffic may make this light appear to be in a steady "on" state.
5	line-out connector	Use the green line-out connector to attach an amplified speaker set.
6	line-in connector	Use the blue line-in connector to attach a record/playback device such as a cassette player, CD player, or VCR.
7	USB connectors (5)	Use the back USB connectors for devices that typically remain connected, such as printers and keyboards.
8	serial connector	Connect a serial device, such as a handheld device, to the serial connector.
9	video connector	If you have a DVI-compatible monitor, plug the cable from your monitor into the white DVI video connector on the back panel. If you have a VGA monitor, see "Connecting a VGA Monitor" on page 230.
10	power connector	Insert the AC power adapter plug.
11	diagnostic lights	See "Diagnostic Lights" on page 347 for a description of light codes that can help you troubleshoot problems with your computer.

Connecting a VGA Monitor

If you have a VGA monitor, plug the adapter cable into the white DVI video connector on the back panel of your computer, and connect the monitor cable to the VGA connector on the adapter.

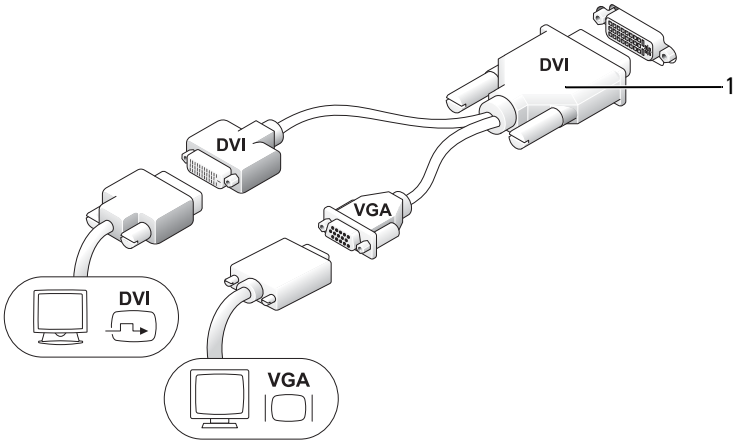


1 cable adapter

2 VGA connector

3 monitor cable

Connecting Two Monitors



1 cable adapter

Use the cable adapter to connect a VGA monitor and a DVI monitor to the DVI-I connector on the back panel.

When you connect two monitors, the video driver will detect this connection and activate the multimonitor functionality.

Removing the Computer Cover

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

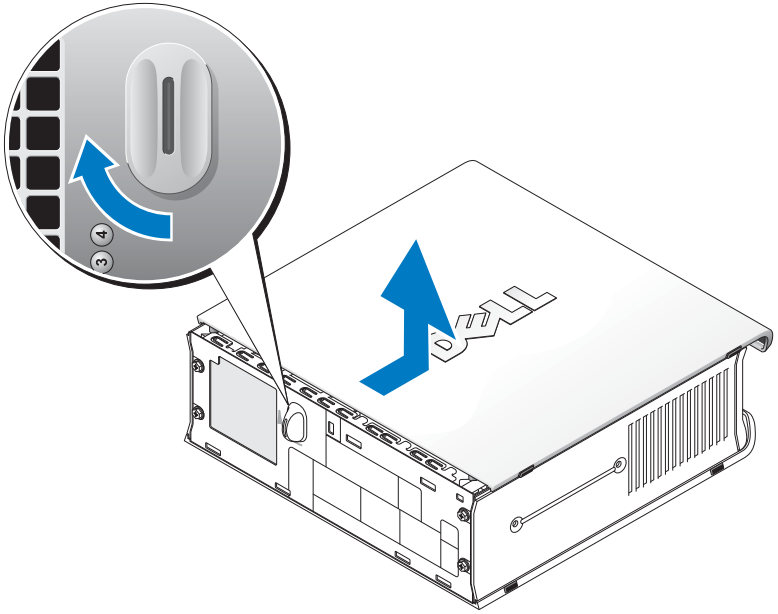
NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 232).

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

3. If applicable, remove the cable cover, (see "Cable Cover (Optional)" on page 237).
4. Remove the computer cover:
   a. Rotate the cover release knob in a clockwise direction, as shown in the illustration.
   b. Slide the computer cover forward by 1 cm (½ inch), or until it stops, and then raise the cover.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.



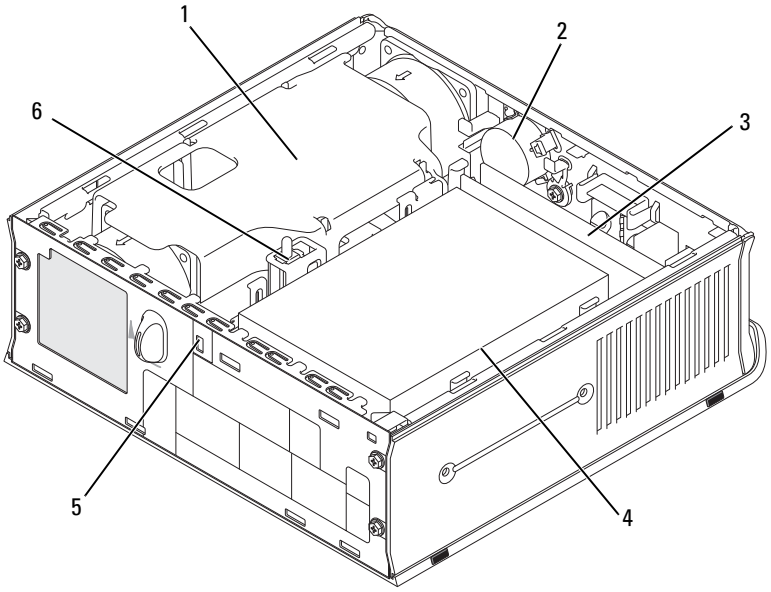
1 release knob

Inside Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To avoid electrical shock, always unplug your computer from the AC power adapter before removing the cover.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.



1	fan shroud/heat sink assembly	4	hard drive
2	speaker (optional)	5	security cable slot
3	memory modules (2)	6	chassis intrusion switch

Chassis Intrusion Switch

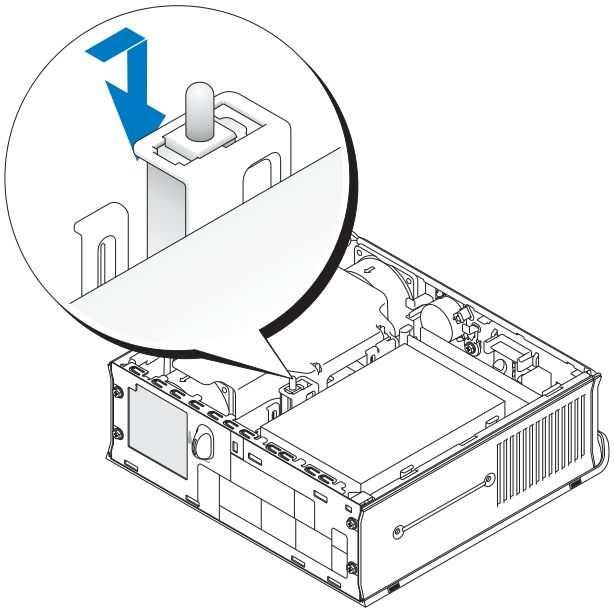
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTE: The chassis intrusion switch is standard on the ultra small form factor computer but is optional on mini tower, desktop and small form factor computers; it may not be present on your computer.

Removing the Chassis Intrusion Switch

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 232).
3. Disconnect the chassis intrusion switch cable from the system board by using two fingers to squeeze the release mechanism on one side of the connector as you pull to disconnect the cable connector.
4. Slide the chassis intrusion switch out of its slot in the metal bracket, and then push it down through the square hole in the bracket to remove the switch and its attached cable from the computer.

NOTE: You may feel a slight resistance as you slide the switch out of the slot.



Replacing the Chassis Intrusion Switch

1. Gently insert the switch from underneath the metal bracket into the square hole in the bracket, and then slide the chassis intrusion switch into its slot until you feel it snap securely into place.
2. Reconnect the cable to the system board.
3. Replace the computer cover (see "Replacing the Computer Cover" on page 317).
4. If you are using a computer stand, attach it to the computer.

Resetting the Chassis Intrusion Detector

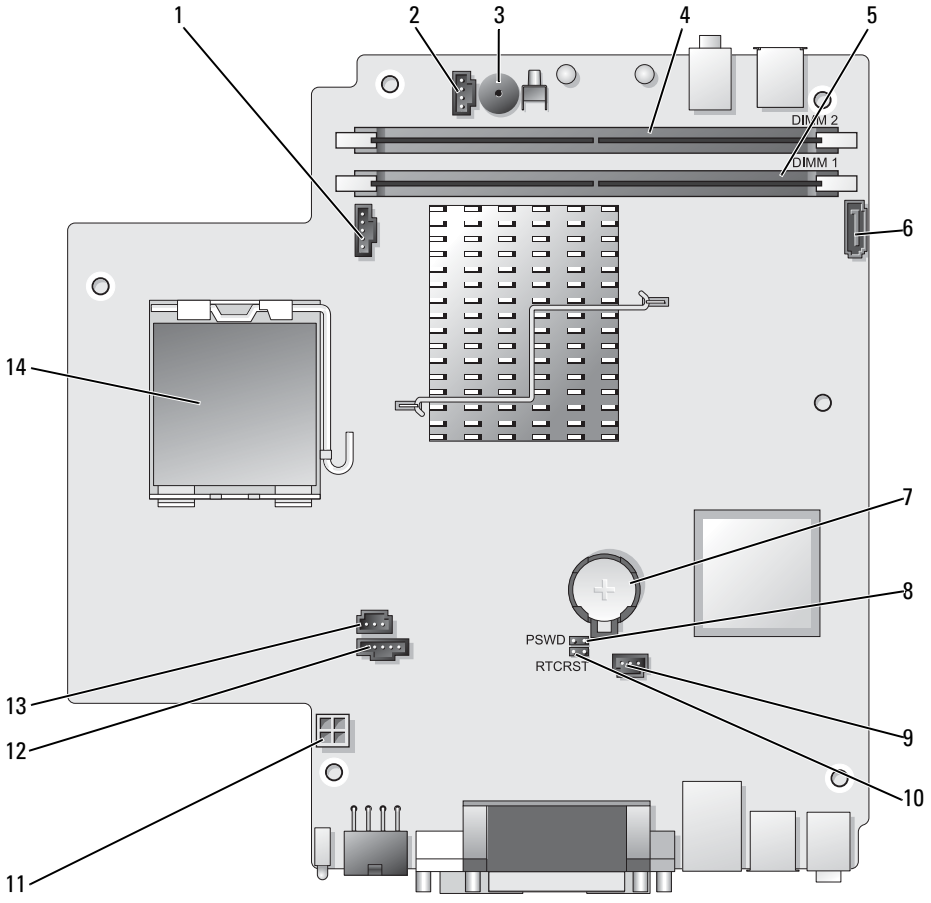
1. Turn on (or restart) your computer.
2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer and try again.
3. Select the **Chassis Intrusion** option and then press the left- or right-arrow key to select **Reset**. Change the setting to **On**, **On-Silent**, or **Disabled**.

NOTE: The default setting is **On-Silent**.

4. Save your BIOS settings and exit system setup.

System Board Components

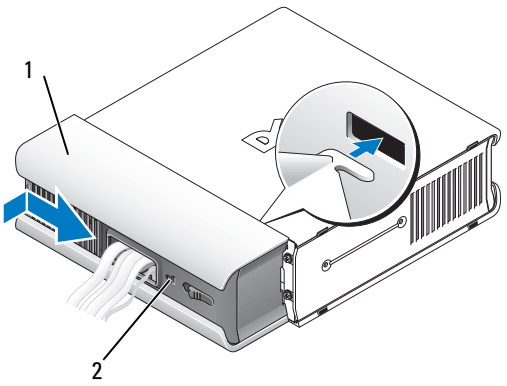


1 fan connector (FAN_FRONT)
2 internal speaker connector (INT_SPKR)
3 system board speaker (BEEP)
4 channel B memory connector (DIMM_2)
5 channel A memory connector (DIMM_1)
6 SATA data cable connector (SATA0)
7 battery (BATT)
8 password jumper (PSWD)
9 hard drive fan connector (FAN_HDD)
10 clear CMOS jumper (RTCRST)
11 hard drive power connector (SATA_PWR)
12 fan connector (FAN_REAR)
13 intrusion switch connector (INTRUDER)
14 processor (CPU)

Cable Cover (Optional)

Attaching the Cable Cover

1. Ensure that all external device cables are threaded through the hole in the cable cover.
2. Connect all device cables to the connectors on the back of the computer.
3. Hold the bottom of the cable cover so as to align the tabs with the slots on the computer's back panel.
4. Insert the tabs into the slots and slide the cover to align the ends of the cover with the ends of the chassis (see the illustration) until the cable cover is securely positioned.
5. Install a security device in the security cable slot (optional).

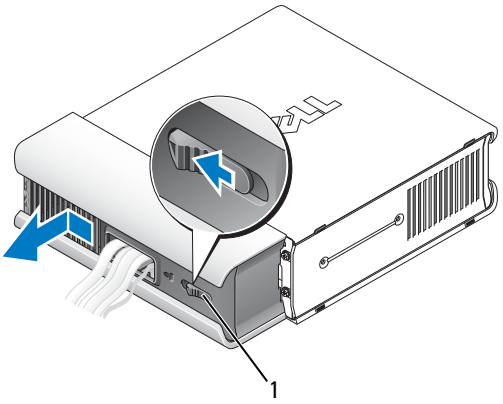


1 cable cover

2 security cable slot

Removing the Cable Cover

1. If a security device is installed in the security cable slot, remove the device.



1 release button

2 Slide the release button, grasp the cable cover, and slide the cover sideways as shown until it stops, and then lift the cable cover up and away.

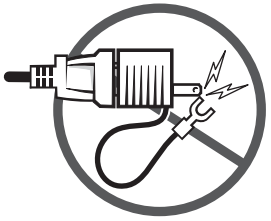
Connecting the AC Power Adapter

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1 Connect the AC power adapter to the power connector on the back of the computer. Ensure that the latch clicks into place for a secure connection.

2 Connect one end of the AC power cable to the power adapter.

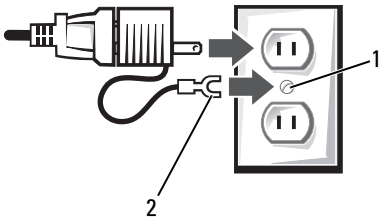
CAUTION: If your power adapter cable has a green grounding wire, *do not permit* contact between the green ground wire and power leads because electrical shock, fire, or damage to your computer can occur.



3 If your AC power cable has a green ground wire for connection to an electrical outlet, connect the metal ground connector to the grounding source (often a screw) on the outlet (see the following illustration):

a Loosen the grounding source.

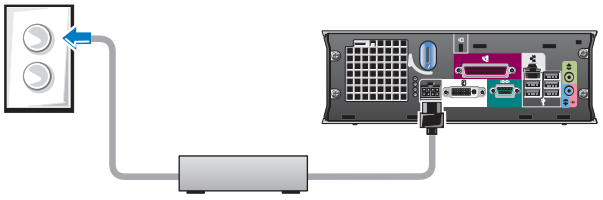
b Slide the metal ground connector behind the grounding source, and then tighten the grounding source.



1 grounding source (screw)

2 metal ground connector

4 Connect the AC power cable to the power outlet.



The AC power adapter has a status light that is off when the adapter is not plugged into the power outlet, and it is green or amber for the following different states:

- green light — solid green indicates that the power adapter is connected to an AC power outlet and to the computer.
- amber light — solid amber indicates that the power adapter is connected to an AC power outlet but not to the computer. The computer will not operate in this condition. Connect the AC power adapter to the computer and/or reset the power adapter by disconnecting and reconnecting the plug to the power outlet.

Dell Badge

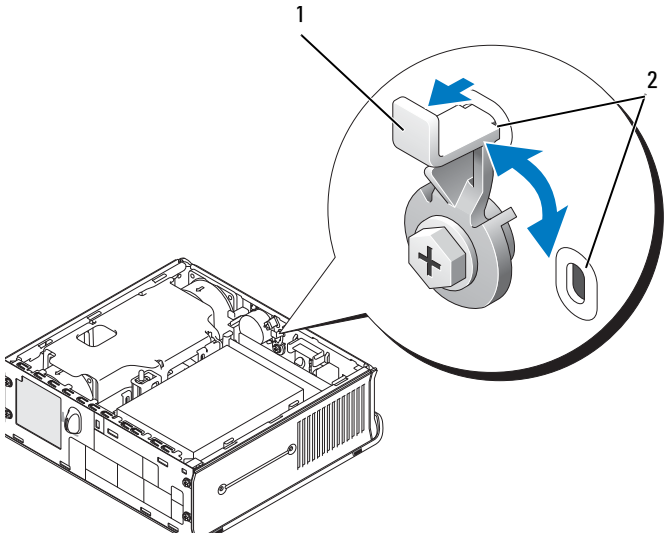
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

The Dell badge on the front of your computer can be rotated. To rotate the badge:

1 Remove the computer cover (see "Removing the Computer Cover" on page 232).

2 Pull on the lever to release the tab from the slot.

3 Rotate the badge to the desired position, ensuring that the tab is secured in the slot.



1	release lever with tab in slot	2	slots (2)

Ultra Small Form Factor Computer Specifications

Microprocessor	
Microprocessor type	The following are supported: • Intel® Core™2 • Intel vPro™ • Intel Celeron®
Internal cache	L1: up to 64 KB; L2: up to 4 MB (depending on your processor)

Memory	
Type	667-MHz or 800-MHz DDR2 SDRAM
Memory connectors	2
Memory modules supported	512 MB, 1 GB, or 2 GB non-ECC
Minimum memory	dual-channel: 1 GB; single-channel: 512 MB
Maximum memory	4 GB
BIOS address	F0000h

Computer Information	
Chipset	Intel Q35 Express Chipset w/ICH9DO
Data bus width	64 bits
Address bus width	32 bits
DMA channels	eight
Interrupt levels	24
BIOS chip (NVRAM)	32 Mb
NIC	integrated network interface with ASF 1.03 and 2.0 support as defined by DMTF Capable of 10/100/1000 communication iAMT 3.0

Video	
Type	Intel Graphics Media Accelerator 3100 with integrated DVI-I with dual-monitor support

Audio	
Type	ADI 1984 High Definition Audio
Stereo conversion	24-bit analog-to-digital; 24-bit digital-to-analog
Controllers	
Drives	one serial ATA controller supporting one device
Expansion Bus	
Bus type	SATA 1.0a and 2.0; USB 2.0
Bus speed	SATA: 1.5 and 3.0 Gbps; USB: 480 Mbps
Drives	
Internal/External	one D-module bay for an optical drive, second hard drive, or floppy drive
	one bay for a 3.5-inch hard drive
Connectors	
External connectors:	
Serial	9-pin connector; 16550C-compatible
Parallel	25-pin connector (bidirectional)
Video	28-pin DVI connector
Network adapter	RJ45 connector
USB	two front-panel and five back panel USB 2.0–compliant connectors
Audio	two back panel connectors for line-in and line-out; two front-panel connectors for headphones and microphone
System board connectors:	
SATA	7-pin connector
Fan	one 3-pin and two 5-pin connectors

Key Combinations	
<Ctrl><Alt><Del>	in Microsoft® Windows® XP, brings up the Windows Security window; in MS-DOS® mode, restarts (reboots) the computer
<F2> or <Ctrl><Alt><Enter>	starts embedded system setup (during system start-up only)
<F3>	automatically starts the computer from the network environment specified by the remote boot environment (PXE) rather than from one of the devices in the system setup **Boot Sequence** option (during start-up only)
<F12> or <Ctrl><Alt><F8>	displays a boot device menu that allows the user to enter a device for a single boot (during system start-up only) as well as options to run hard drive and system diagnostics
<Ctrl><p>	displays the Management Engine BIOS Extension settings screen that allows you to modify the settings

Controls and Lights	
Power control	push button
Power light	green light — Blinking green indicates a sleep mode; solid green indicates the power-on state. amber light — Blinking amber indicates a problem with an installed device; solid amber indicates an internal power problem (See "Power Problems" on page 339.)
Power supply status light	green light — Solid green indicates the power adapter is connected to an AC outlet and the computer. amber light — Solid amber indicates the power adapter is connected to an AC outlet but not the computer.
hard drive access light	green
Link integrity light (on integrated network adapter)	green light for 10-Mb operation; orange light for 100-Mb operation; yellow light for a 1000-Mb (1-Gb) operation
Activity light (on integrated network adapter)	yellow blinking light
Diagnostic lights	four lights on the back panel (See "Diagnostic Lights" on page 347.)
Standby power light	AUX_PWR on the system board

Power	
DC external power supply:	**NOTE:** Power consumption from an AC power source can be zero when the computer is unplugged from that power source. However, the computer draws a minute amount of power from the internal coin cell battery even when the computer is not drawing power from the AC power source.
Wattage	220 W
Heat dissipation	751 BTU/hr **NOTE:** Heat dissipation is calculated based upon the power supply rating.
Voltage	auto-sensing power supplies — 90 to 135 V at 50/60 Hz; 180 to 265 V at 50/60 Hz
Backup battery	3-V CR2032 lithium coin cell

Physical	
Without cable cover:	
Height	26.4 cm (10.375 inches)
Width	8.9 cm (3.5 inches)
Depth	25.3 cm (9.95 inches)
Weight	4.5 kg (10 lb)
With standard cable cover:	
Height	26.4 cm (10.375 inches)
Width	8.9 cm (3.5 inches)
Depth	33 cm (13 inches)
Weight	4.9 kg (10.8 lb)
With extended cable cover:	12.34 kg (27.2 lb)
Height	26.4 cm (10.375 inches)
Width	8.9 cm (3.5 inches)
Depth	36.1 cm (14.2 inches)

Environmental	
Temperature:	
Operating	10° to 30°C (50° to 86°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	20% to 80% (noncondensing)
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 0.5 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	bottom half-sine pulse with a change in velocity of 50.8 cm/sec (20 inches/sec)
Storage	27-G faired square wave with a velocity change of 508 cm/sec (200 inches/sec)
Altitude:	
Operating	–15.2 to 3048 m (–50 to 10,000 ft)
Storage	–15.2 to 10,668 m (–50 to 35,000 ft)
Airborne contaminant level	G2 or lower as defined by ISA-S71.04-1985

Drives

Your computer supports:

- One SATA (serial ATA) hard drive
- One optional Dell D-module optical drive, second hard drive, or floppy drive in the module bay (See "Module Bay" on page 255 for information on installing and removing devices in the module bay.)

General Installation Guidelines

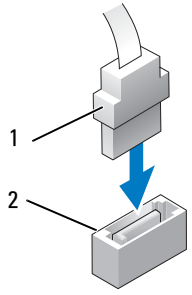
NOTE: For information on installing D-module drives, see the documentation that came with your optional device.

Connecting Drive Cables

When you install a drive, you connect two cables—a DC power cable and a data interface cable—to the back of the drive.

Data Interface Connectors

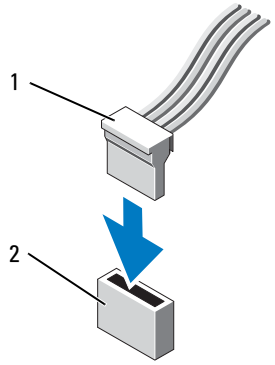
SATA Connector



1 data interface cable connector

2 data interface connector

Power Cable Connectors

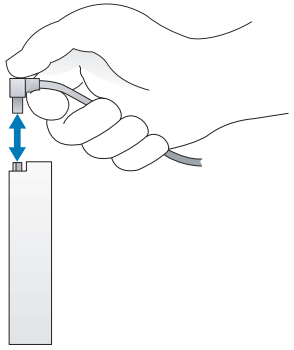


1 power cable

2 power input connector

Connecting and Disconnecting Drive Cables

When connecting and disconnecting a SATA data cable, hold the cable by the black connector at each end. When removing a cable with a pull-tab, grasp the colored pull-tab and pull until the connector detaches.



Hard Drive

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

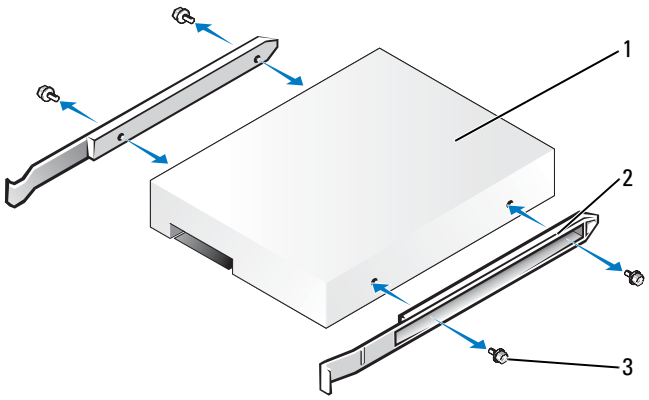
CAUTION: To guard against electrical shock, always unplug your computer from the power supply before removing the hard drive.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

NOTICE: To avoid damage to the drive, do not set it on a hard surface. Instead, set the drive on a surface, such as a foam pad, that will sufficiently cushion it.

Installing a Hard Drive

1 If you are installing a new drive, rather than replacing an already installed drive, attach the plastic drive rails—located inside the cover—to the new drive and skip to step 9.



1 drive
2 drive rails (2)
3 screws (4)

2 If you are replacing a hard drive that contains data you want to keep, back up your files before you begin this procedure.

3 Check the documentation for the drive to verify that the drive is configured for your computer.

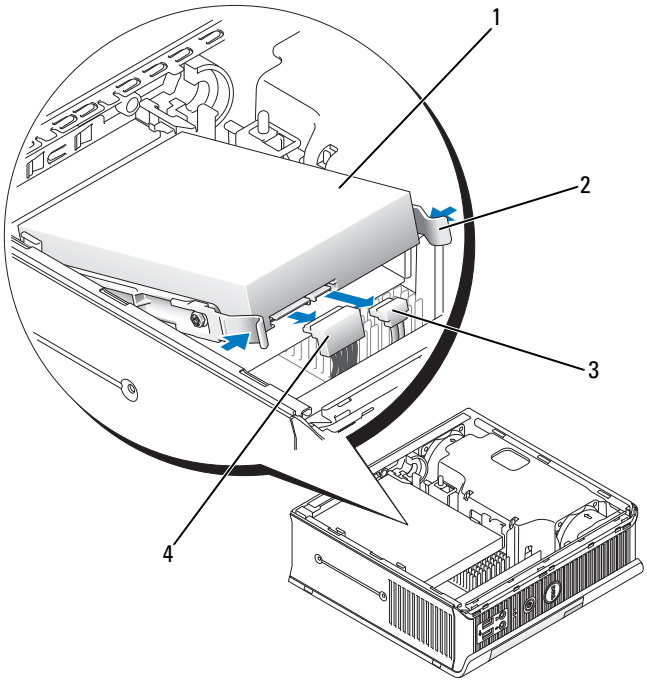
4 Follow the procedures in "Before You Begin" on page 21.

5 Remove the computer cover (see "Removing the Computer Cover" on page 168).

6 Remove the installed hard drive:

a With one hand, squeeze the drive rails so as to push the two rails toward each other.

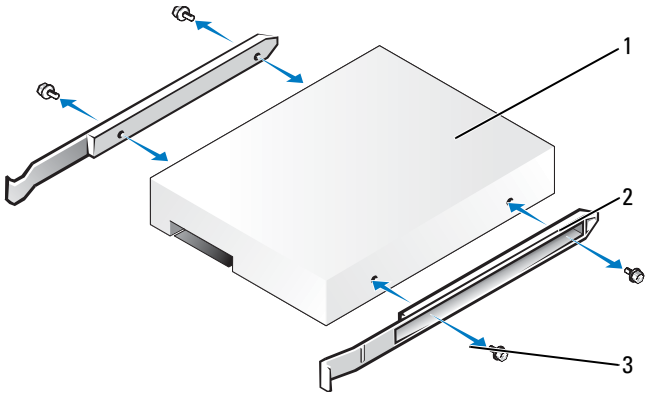
b Slide the drive slightly forward, and rotate the hard drive up and away from the hard drive bracket.



1 hard drive
2 drive rails (2)
3 data cable connector
4 power cable connector

7 Disconnect the data and power cables from the drive connectors.

8 Remove the four screws that secure the drive rails to the existing hard drive, and attach the drive rails to the replacement hard drive.



1 drive

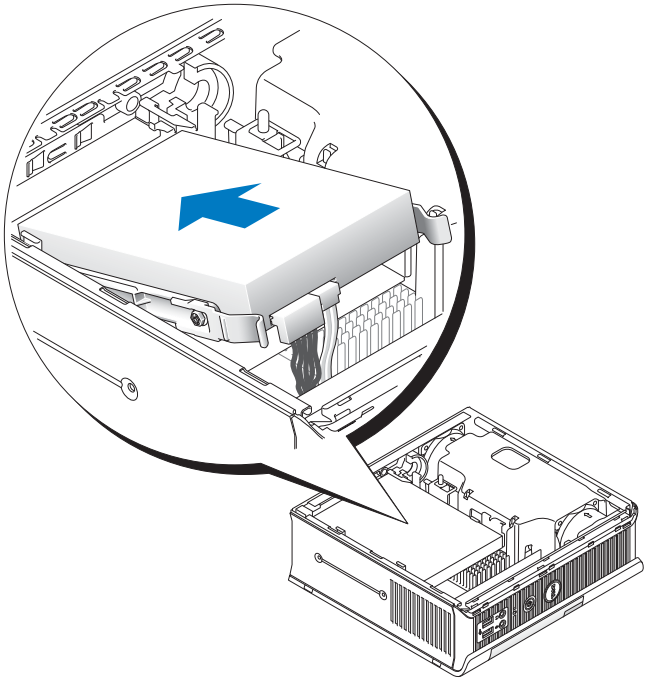
2 drive rails (2)

3 screws (4)

NOTICE: Serial ATA data and power connectors are keyed for correct insertion; that is, a notch or a missing pin on one connector matches a tab or a filled-in hole on the other connector. When connecting cables to a drive, ensure that the connectors are oriented properly before you attach the cables to the drive.

9 Attach the data and power cables to the hard drive connectors, ensuring that the connectors are properly oriented before connecting them.

10 Slide the hard drive into the hard drive bracket.



11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

12 Replace the cable cover, if used.

See the documentation that came with the drive for instructions on installing any software required for drive operation.

13 Reboot the computer.

14 Partition and logically format your drive before you proceed to the next step.

For instructions, see the documentation that came with your operating system.

15 Test the hard drive by running the Dell Diagnostics (see "Dell Diagnostics" on page 353).

16 Install your operating system on the hard drive.

For instructions, see the documentation that came with your operating system.

Replacing a Hard Drive Fan

1 Follow the instructions in "Before You Begin" on page 21.

2 Remove the hard drive (see "Hard Drive" on page 248).

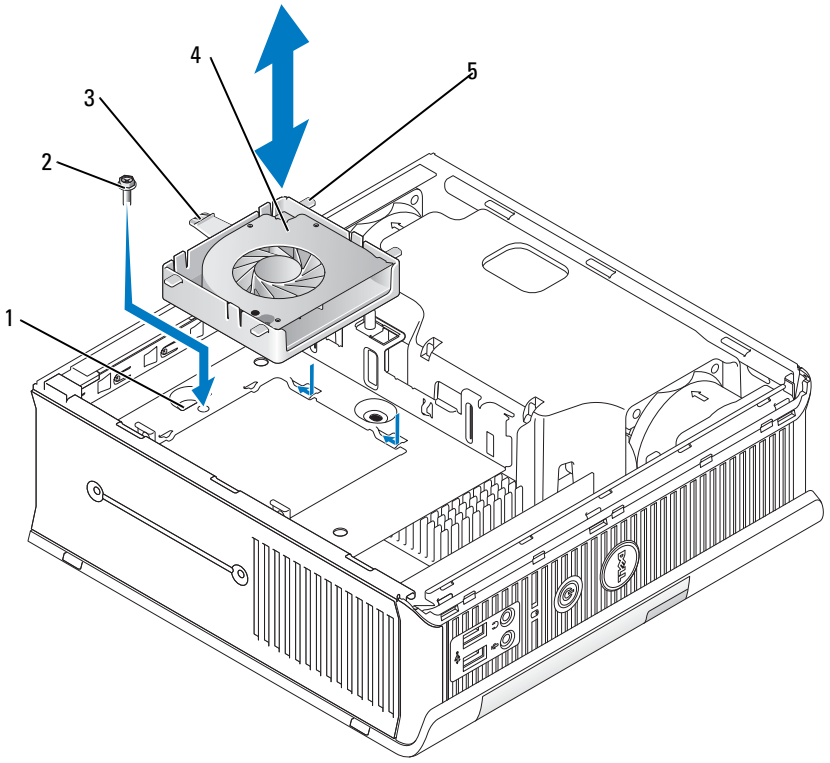
3 Remove the hard drive fan:

a Remove the screw that secures the fan release tab to the hard drive bracket.

b Press down on the fan release tab, and then slide the fan towards the front of the computer so that its side tabs are free of the corresponding slots in the hard drive bracket.

c Lift to remove the fan from the hard drive bracket.

d Unplug the fan.



1 hard drive bracket

2 screw

3 fan release tab

4 fan

5 side tab

4 Replace the hard drive fan:

a Plug the fan into the computer.

b Align the four side tabs and release tab on the fan with the five corresponding slots on the hard drive bracket.

c Slide the release tab beneath the metal housing covering its slot, and then slide the fan towards the back of the computer.

d Replace the screw to secure the fan release tab to the hard drive bracket.

Module Bay

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

You can install a Dell™ removable device such as a floppy drive, optical drive, or second hard drive in the module bay. You can also install an airbay (filler blank) in the bay if you do not plan to install a drive.

Your Dell computer ships with either an optical drive or an airbay (filler blank) installed in the module bay. The airbay is held in the module bay with a security screw only. You can secure a optical drive in the module bay using two methods:

- Locking switch (accessed by removing the computer cover)
- Security screw (packaged separately)

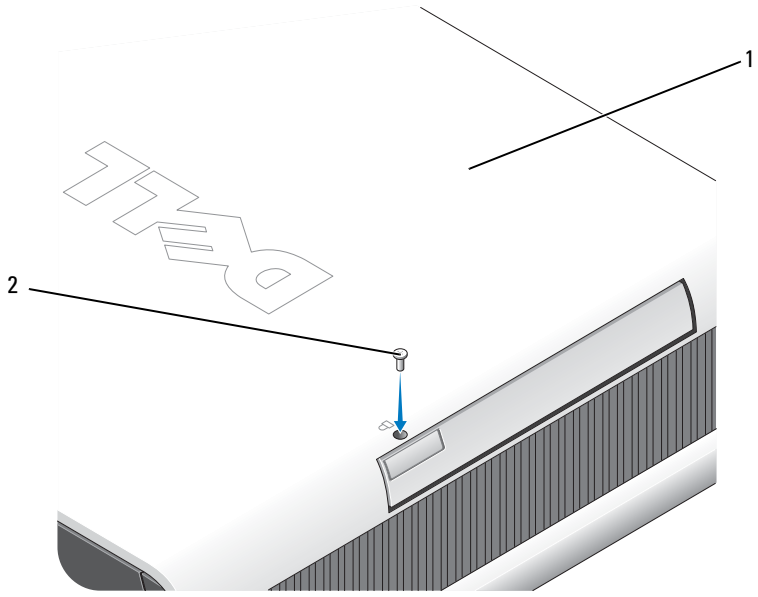
See "Securing a Device in the Module Bay" on page 259 for more information about securing a device in your computer.

NOTICE: To prevent damage to devices, place them in a safe, dry place when they are not installed in the computer. Avoid pressing down on them or placing heavy objects on top of them.

Installing a Device When Your Computer Is Turned Off

To install a device in the module bay:

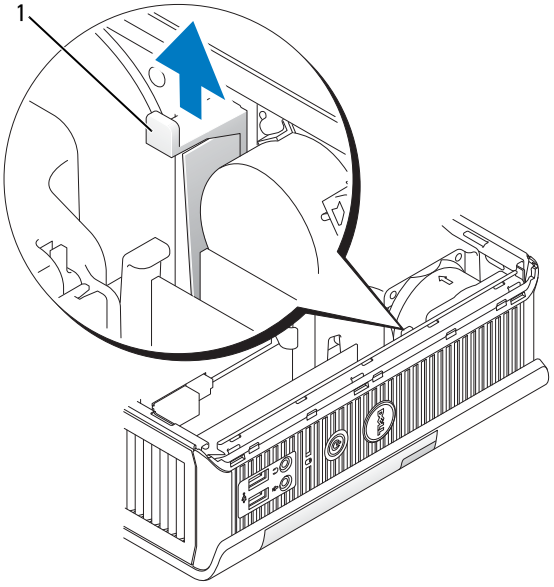
1. Remove any installed device from the bay. If the module bay contains an airbay, remove the security screw and pull the airbay out of the module bay and skip to step 5.



1 bottom of computer

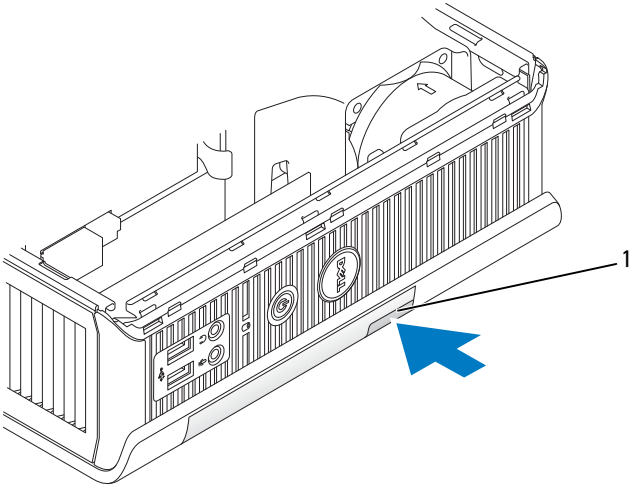
2 security screw

2 If the module bay contains a device that is locked with the locking switch, remove the cover (see "Removing the Computer Cover" on page 232) and lift the module locking switch to the unlocked position. If a security screw is also used, remove the screw.



1 module locking switch

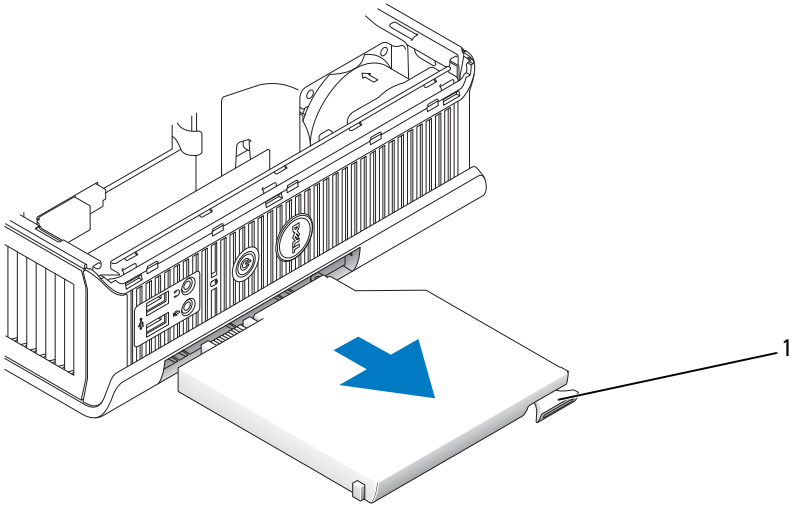
3 Press the device latch release so that the latch release pops out.



1 device latch release

NOTICE: Do not place any heavy objects on top of the computer. Doing so may bend the chassis and cause difficulty in removing a module device.

4 Pull the device by the latch release to remove the device from the module bay.



1 latch release

5 Slide the new device into the module bay.

6 If desired, you may lock the new device in the module bay by moving the module locking switch to the locked position (you must remove the computer cover to use the locking switch).

7 If you removed the cover to lock the device in the module bay, replace the computer cover (see "Replacing the Computer Cover" on page 317).

Removing and Installing a Device When Your Computer Is Running Microsoft® Windows®

1 To remove a device installed in the module bay, double-click the **Safely Remove Hardware** icon on the taskbar.

2 In the list of devices that appears on your screen, click the device you want to eject.

NOTE: You cannot remove a device if your computer is turned on and the device is locked in the module bay. You must shut down the computer and follow the steps in "Installing a Device When Your Computer Is Turned Off" on page 255 to remove a locked device.

NOTICE: Do not place any heavy objects on top of the computer. Doing so may bend the chassis and cause difficulty in removing a module device.

3 When a computer message indicates that you can remove the device, remove the device from the module bay.

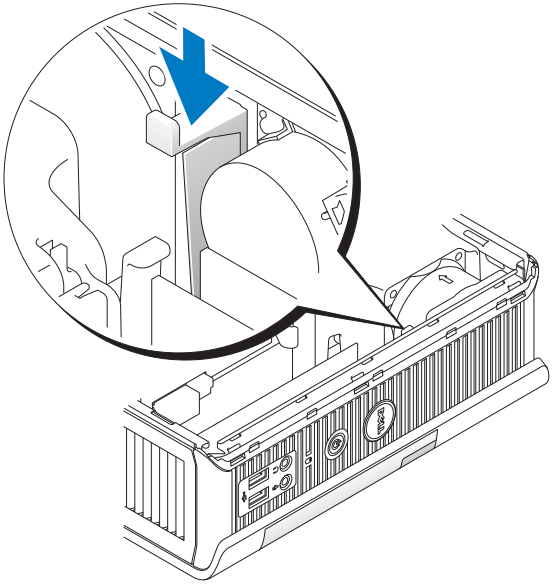
4 Slide the new device into the module bay.

Securing a Device in the Module Bay

1 To secure a device in the module bay, your computer is equipped with a module locking switch. To use this switch:

a Remove the computer cover (see "Removing the Computer Cover" on page 232).

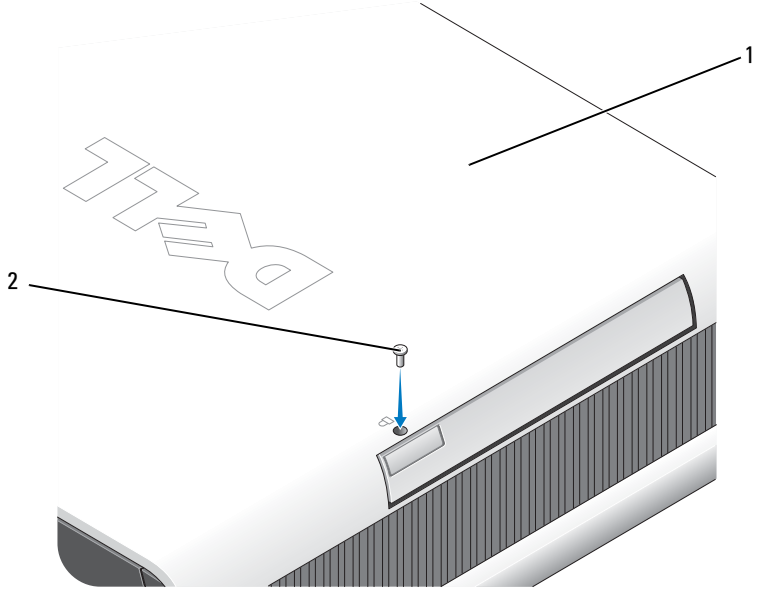
b Gently press the module locking switch down until it locks into place.



c Replace the computer cover (see "Replacing the Computer Cover" on page 317).

The module cannot be removed from the computer until you lift the module locking switch into its unlocked position.

2 You may also secure a device in the module bay by using a security screw (packaged separately), accessed from the bottom of the computer.



1 bottom of computer

2 security screw

Processor

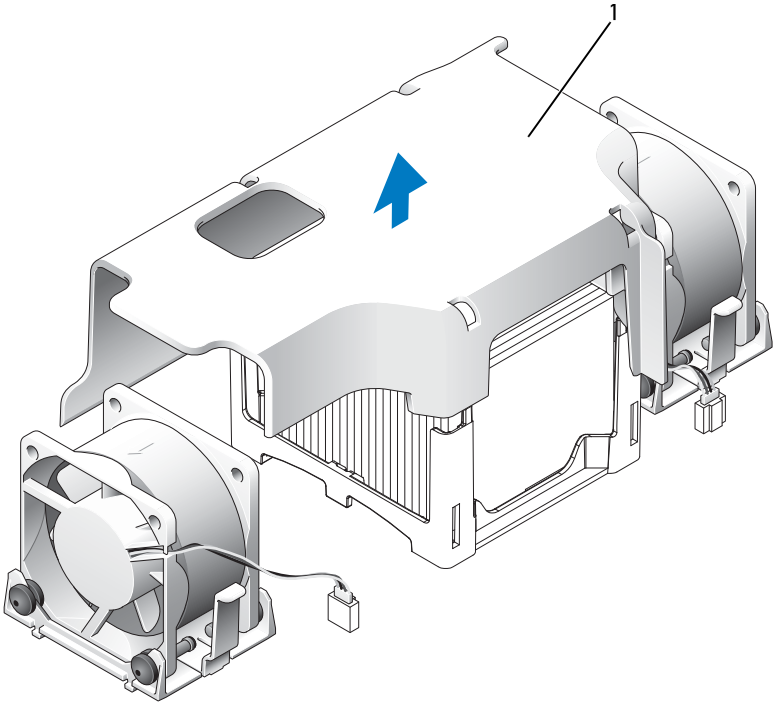
CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before removing the cover.

NOTICE: When replacing the processor, do not touch the underside of the new processor.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" on page 168).
3. Remove the fan shroud by lifting the fan shroud up and away from the computer.

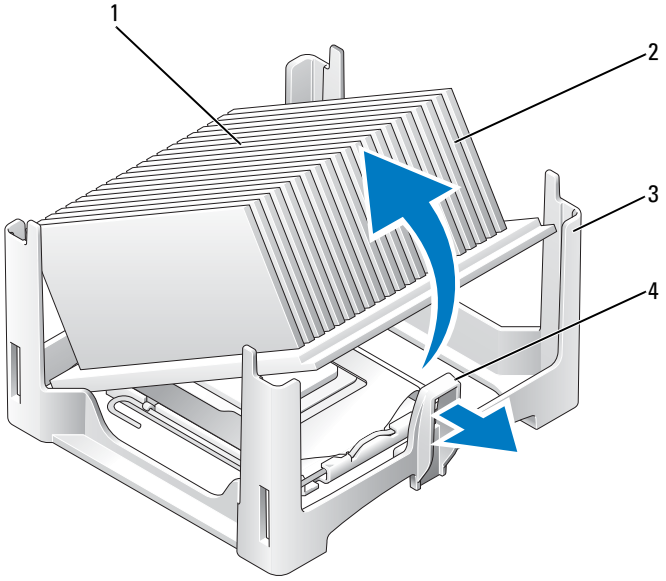


1 fan shroud

CAUTION: The heat sink can get extremely hot. Ensure that the heat sink has had sufficient time to cool before you touch it.

4 Remove the heat sink:

a Press the release lever on the retention base until the heat sink is released.



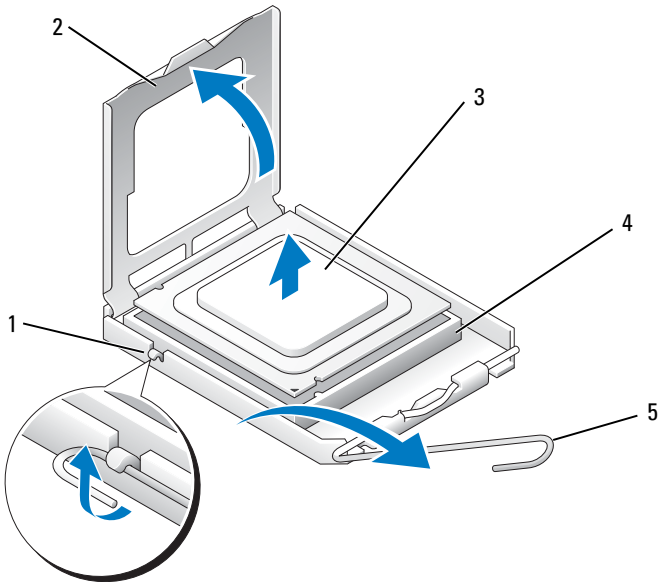
1 top of heat sink
2 heat sink
3 retention base
4 release tab

b Gently lift the heat sink from the processor.

c Lay the heat sink down on its top, with the thermal grease facing upward.

NOTICE: Unless a new heat sink is required for the new processor, reuse the original heat sink assembly when you replace the processor.

5 Pull the release lever straight up until the processor is released, and then remove the processor from the socket.



1 center cover latch
2 processor cover
3 processor
4 socket
5 release lever

NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

NOTICE: When replacing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

6 Unpack the new processor, being careful not to touch the underside of the processor.

7 If the release lever on the socket is not fully extended, move it to that position.

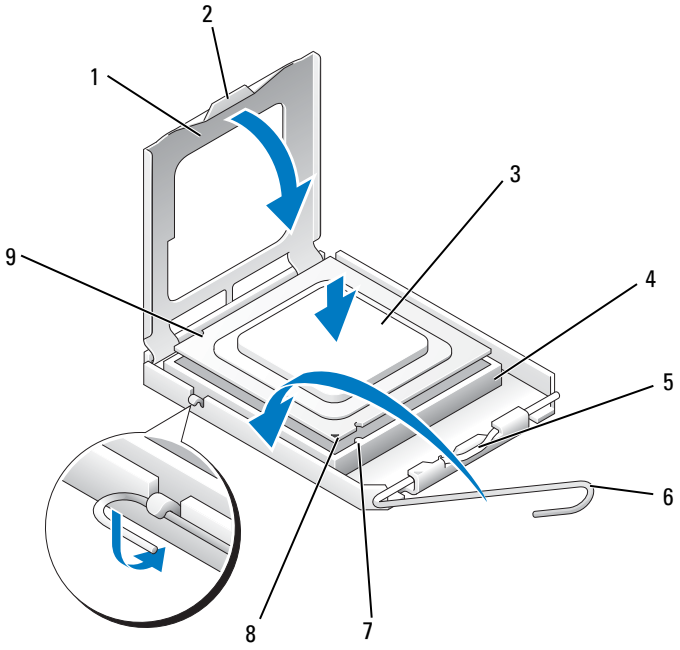
8 Orient the front and rear alignment-notches on the processor with the front and rear alignment-notches on the socket.

9 Align the pin-1 corners of the processor and socket.

NOTICE: To avoid damage, ensure that the processor aligns properly with the socket, and do not use excessive force when you install the processor.

10 Set the processor lightly in the socket and ensure that the processor is positioned correctly.

11 When the processor is fully seated in the socket, pivot the release lever back toward the socket until it snaps into place to secure the processor.



1	processor cover	6	release lever
2	tab	7	front alignment-notch
3	processor	8	socket and processor pin-1 indicator
4	processor socket	9	rear alignment-notch
5	center cover latch		

If you are installing a processor replacement kit from Dell, return the processor to Dell in the same package in which your replacement kit was sent.

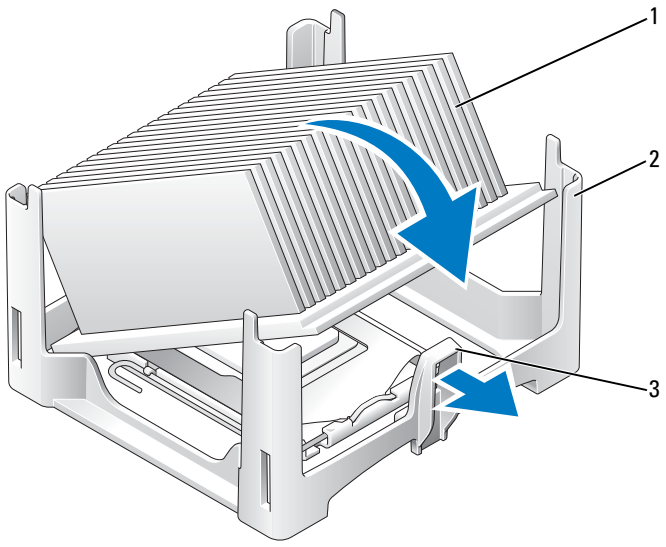
NOTICE: Ground yourself by touching an unpainted metal surface on the back of the computer.

12 Clean the thermal grease from the bottom of the heat sink.

NOTICE: Ensure that you apply new thermal grease. New thermal grease is critical for ensuring adequate thermal bonding, which is a requirement for optimal processor operation.

13 Apply the new thermal grease to the top of the processor.

14 Place one end of the heat sink under the tab on the retention base on the side opposite the release lever.



1 heat sink
2 retention base
3 release lever

15 Lower the heat sink onto the processor at a 45-degree angle so that one end of the heat sink fits securely under the tab opposite the release tab on the retention base.

16 Re-assemble the shroud.

17 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

18 Replace the cable cover, if used (see "Cable Cover (Optional)" on page 237).

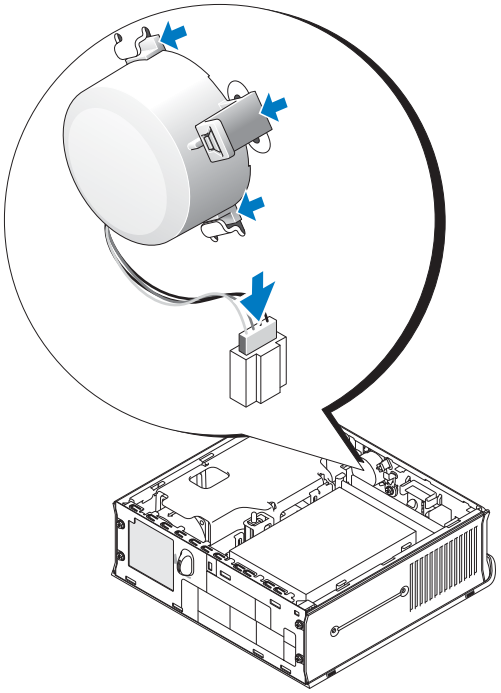
Speakers

Installing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide.*

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 168).
3. Insert the speaker into the chassis of the computer.



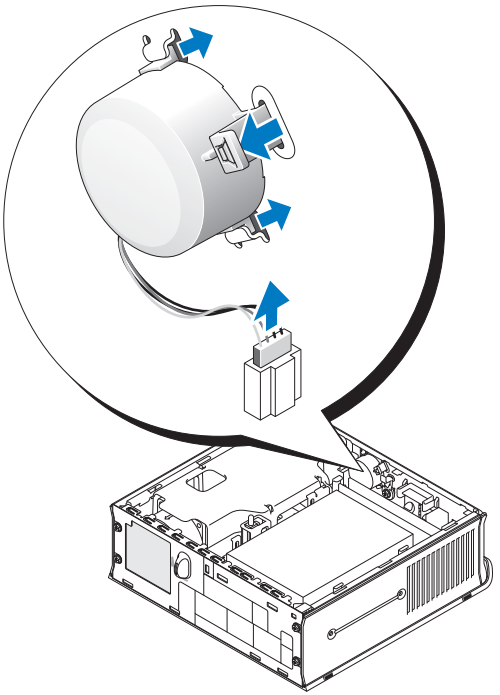
4. Connect the cables to the system board.
5. Replace the computer cover.
6. Turn on power to the computer.

Removing a Speaker

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the cover of your computer (see "Removing the Computer Cover" on page 168).
3. Disconnect the cables from the system board.
4. Remove the speaker from the chassis of the computer.



5. Replace the computer cover.
6. Turn on power to the computer.

Advanced Features

LegacySelect Technology Control

LegacySelect technology control offers legacy-full, legacy-reduced, or legacy-free solutions based on common platforms, hard drive images, and help desk procedures. Control is provided to the administrator through system setup, Dell OpenManage™ IT Assistant, or Dell custom-factory integration.

LegacySelect allows administrators to electronically activate or deactivate connectors and media devices that include serial and USB connectors, a parallel connector, a floppy drive, PCI slots, and a PS/2 mouse. Connectors and media devices that are deactivated make resources available. You must restart the computer to effect the changes.

Manageability

DASH

DASH (Desktop and mobile Architecture for System Hardware) is a Desktop Management Task Force (DMTF) management initiative that standardizes the manageability interfaces for mobile and desktop hardware. The focus of the DASH architecture is to enable the remote management of desktop and mobile computing resources in a standard manner that is independent of operating state. Your computer supports early versions of the DASH initiative including the following management profiles:

- Base Desktop Mobile
- Power State Management
- Boot Control
- CPU
- System Memory
- Fan
- Power Supply
- Sensor
- Physical Asset
- Software Inventory

NOTE: If you have chosen to use "None" (no manageability) or ASF, you will be unable to take advantage of DASH features and profiles.

Active Management Technology

Intel Active Management Technology (iAMT) provides secure systems management capabilities that reduce IT costs and allow better discovery, healing, and protection of networked computing assets. With iAMT, computers can be managed regardless of whether the computer is on, off, or the operating system is hung.

NOTE: iAMT can be configured using Dell Client Manager (DCM) 2.1.1 or later. For complete information on how to configure iAMT, see the Dell Client Manager 2.1.1 (or later) documentation on **www.dell.com\openmanage**. For more information about Dell's iAMT implementation, see the *Client Systems Management Administrator's Guide* available on the Dell Support website at **support.dell.com**.

Key benefits of iAMT are:

- Reduced desk-side visits
- Automation of more management functionality through enablement of systems management console software
- Improved security

iAMT Features

Basic Functionality

- Ability to discover, track, and inventory assets in the presence or absence of the operating systems. The computer must have the power cable connected and must be connected to the network.
- Ability to power on and power off the computer remotely, whatever the state of the operating system.

Advanced Functionality

NOTE: Additional management software and purchasing options are required for some of the following features.

- Ability to do remote issues remediation (1-to-1) via text-based console redirection (Serial-over-LAN) and IDE redirection.
- Hardened security via agent presence (enables detection of removed agents) and network access control (Circuit breaker) and software version control

Your computer aids in troubleshooting iAMT by providing the following iAMT related error messages:

Error Message	Description
`SERVICE_MODE jumper: The service mode jumper is installed`	Do not populate the SERVICE_MODE jumper. AMT will not function properly. Only manufacturing uses this jumper.
`MEMORY: Unsupported memory configuration. Populate DIMM1.`	Unable to launch ME. AMT functionality is broken when DIMM1 is not populated.

Out of Band Management

The term "out of band" refers to the ability to manage the computer in the absence of an operating system or with the operating system in an unusable state, or with the computer powered off. The only requirement for managing such a computer is for AMT capability to be enabled and a network cable plugged into the integrated network adapter.

NOTE: Power is supplied to the DIMMs even when the computer is turned off.

Accessing iAMT setup

Intel's Management Engine BIOS Extension (MEBx) interface controls the iAMT features and setup options for your computer. MEBx is used to:

- Turn on or off iAMT
- Set iAMT modes
- Set iAMT configuration modes

To view the MEBx setup screen, press <Ctrl><p> during the boot process of your computer when you turn it on. Your default MEBx password is **admin**.

NOTE: To make configuration setting changes, the default MEBx password must be changed.

Turning Off iAMT

iAMT is enabled in the Management Engine (ME) firmware by default. However, you may choose to turn off the iAMT feature.

To turn off iAMT:

1. Press <Ctrl-P> to enter the MEBx setup and enter your password.
2. Select **Intel® ME Configuration→ Intel ME Features Control → Manageability Feature Selection**
3. Select **None**.
4. Select **Return to Previous Menu** twice.

   Changes are applied and the computer reboots.

USB Provisioning

iAMT can be provisioned using a USB key and Dell Client Manager. The USB key must:

- Be formatted using the FAT16 file system with no system files
- Contain only the **setup.bin** file

NOTE: The key should not be bootable.

To provision AMT using a USB key, plug the USB key into a USB port prior to boot. During POST, the BIOS displays a message stating that the computer is being provisioned.

Alert Standard Format

ASF is a DMTF management standard that specifies "pre-operating system" or "operating system-absent" alerting techniques. The standard is designed to generate an alert on potential security and fault conditions when the operating system is in a sleep mode or the computer is turned off. ASF is designed to supersede previous operating-system-absent alerting technologies.

Your computer supports the following ASF version 1.03 and 2.0 alerts and remote capabilities:

Alert	Description
`Chassis: Chassis Intrusion – Physical Security Violation/Chassis Intrusion – Physical Security Violation Event Cleared`	The computer chassis with the chassis intrusion feature (optional on some computers) installed and enabled has been opened or the chassis intrusion alert has been cleared.
`CPU: Emergency Shutdown Event`	The processor temperature is too hot and the power supply has shut down.
`Cooling Device: Generic Critical Fan Failure/Generic Critical Fan Failure Cleared`	The fan speed (rpm) is out of limits or the fan speed (rpm) problem has been resolved.
`Temperature: Generic Critical Temperature Problem/Generic Critical Temperature Problem Cleared`	The computer temperature is out of limits or the computer temperature problem has been resolved.
`Battery Low`	The computer battery has reached a voltage of 2.2 V or lower.

ASF allows Remote Management and Control Protocol (RMCP) messages to be exchanged between a remote management console and a client computer that is in a "pre-operating system" or "operating system-absent" state. RMCP messages can be sent to instruct a client computer to start up, shut down, or restart.

For more information about Dell's ASF implementation, see the *ASF User's Guide* and the *ASF Administrator's Guide*, which are available on the Dell Support website at **support.dell.com**.

Dell OpenManage™ Applications

NOTE: Either Dell OpenManage™ applications and Dell™ Client Manager (DCM) are available for your computer to help meet your system management needs. See "Dell Client Manager (DCM)" on page 273 for information about DCM.

You can manage your computer via IT Assistant and Dell OpenManage Client Instrumentation (OMCI).

IT Assistant configures, manages, and monitors computers and other devices on a corporate network. IT Assistant manages assets, configurations, events (alerts), and security for computers equipped with industry-standard management software. It supports instrumentation that conforms to SNMP and CIM industry standards.

For information on IT Assistant, see the *Dell OpenManage IT Assistant User's Guide* available on the Dell Support website at **support.dell.com**.

Dell OpenManage Client Instrumentation is software that enables remote management programs such as IT Assistant to do the following:

- Access information about your computer, such as how many processors it has and what operating system it is running.
- Monitor the status of your computer, such as listening for thermal alerts from temperature probes or hard drive failure alerts from storage devices.

A computer that has Dell OpenManage Client Instrumentation set up on a network that uses IT Assistant is a managed computer. For information about Dell OpenManage Client Instrumentation, see the *Dell OpenManage Client Instrumentation User's Guide* available on the Dell Support website at **support.dell.com**.

Dell Client Manager (DCM)

NOTE: Either Dell™ Client Manager (DCM) or Dell OpenManage™ applications are available for your computer to help meet your system management needs. See "Dell OpenManage™ Applications" on page 272 for information about Dell OpenManage products.

Dell Client Manager (DCM) Console

The Dell Client Manager (DCM) console allows you to configure, manage, and monitor Dell computers on a corporate network via a simple GUI interface. Through the DCM console you can manage assets, configurations, events (alerts), status, and security for computers equipped with industry-standard management software. For information about standards supported by DCM, see **www.altiris.com**.

For information about the DCM console, see **www.altiris.com** or the Dell Support website at **support.dell.com**.

The DCM console also allows you to:

- Access information about your computer, such as how many processors it has and what operating system it is running.
- Monitor the status of your computer, such as listening for thermal alerts from temperature probes or hard drive failure alerts from storage devices.
- Change the state of your computer by updating its BIOS, configuring BIOS settings, or shutting it down remotely.

With Dell Client Manager installed on a console and its client software installed on client computers, you have a managed computer. For information about DCM, see the Dell Support website at **support.dell.com**.

Physical Security

Chassis Intrusion Detection

NOTE: When the administrator password is enabled, you must know the administrator password before you can reset the **Chassis Intrusion** setting.

This (optional on some computers) feature, if installed and enabled, detects that the chassis was opened and alerts the user. To change the **Chassis Intrusion** setting:

1. Enter system setup (see "Entering System Setup" on page 280).
2. Press the down-arrow keys to move to the **System Security** option.
3. Press <Enter> to access the **System Security** option's pop-up menu.
4. Press the down-arrow key to move to the **Chassis Intrusion** setting.
5. Press <Enter> to select an option setting.
6. Press <Enter> again after you update the option setting.
7. Exit and save system setup.

Option Settings

- **On** — If the computer cover is opened, the setting changes to **Detected**, and the following alert message displays during the boot routine at the next computer start-up:

  `Alert! Cover was previously removed.`

  To reset the **Detected** setting, enter system setup (see "Entering System Setup" on page 280). In the **Chassis Intrusion** option, press the left- or right-arrow key to select **Reset**, and then choose **On**, **On-Silent**, or **Off**.

- **On-Silent** (default setting) — If the computer cover is opened, the setting changes to **Detected**. No alert message appears during the boot sequence at the next computer start-up.
- **Off** — No intrusion monitoring occurs and no messages appear.

Padlock Ring and Security Cable Slot

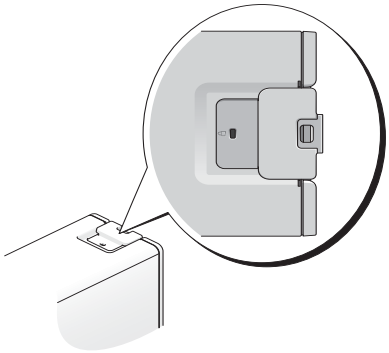
Use one of the following methods to secure your computer:

- Use a padlock alone or a padlock and looped security cable with the padlock ring.

  A padlock alone prevents the computer from being opened.

  A security cable looped around a stationary object is used in conjunction with a padlock to prevent unauthorized movement of the computer.

- Attach a commercially available antitheft device to the security cable slot on the top of the computer.



NOTE: On the ultra small form factor computer, the security cable slot is located on the back of the computer (see "Back View" on page 229).

NOTE: Before you purchase an antitheft device, make sure that it works with the security cable slot on your computer.

Antitheft devices usually include a segment of metal-stranded cable with an attached locking device and key. The documentation that comes with the device contains instructions for installing it.

Trusted Platform Module (TPM)

NOTE: Computers shipping into China are not equipped with TPM.

NOTE: The TPM feature supports encryption only if the operating system supports TPM. For more information, see the TPM software documentation and the help files that came with the software.

TPM is a hardware-based security feature that can be used to create and manage computer-generated encryption keys. When combined with security software, the TPM enhances existing network and computer security by enabling features such as file protection capabilities and protected e-mail. The TPM feature is enabled through a system setup option.

NOTICE: To secure your TPM data and encryption keys, follow the backup procedures documented in the *Archive and Restore* section of the EMBASSY Security Center help file. In the event of these backups being incomplete, lost, or damaged, Dell will be unable to assist in the recovery of encrypted data.

Enabling the TPM Feature

1. Enable the TPM software:
   a. Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.
   b. Select **Security→ TPM Security** and press <Enter>.
   c. Under **TPM Security**, select **On**.

d Press <Esc> to exit the setup program.

e If prompted, click **Save/Exit**.

2 Activate the TPM setup program:

a Restart the computer and press <F2> during the Power On Self Test to enter the system setup program.

b Select **Security→ TPM Activation** and press <Enter>.

c Under **TPM Activation**, select **Activate** and press <Enter>.

NOTE: You only need to activate TPM once.

d Once the process is complete, the computer either restarts automatically or prompts you to restart your computer.

Security Management Software

The security management software is designed to utilize four different features to help you secure your computer:

- Log-in management
- Pre-boot authentication (using a fingerprint reader, smart card, or password)
- Encryption
- Private information management

For information about how to use the software and the different security features, see the *Getting Started Guide* for the software:

Click **Start→ All Programs→ Wave Systems Corp→ Getting Started Guide.**

Computer Tracking Software

Computer tracking software may enable you to locate your computer if it is lost or stolen. The software is optional and may be purchased when you order your Dell™ computer, or you can contact your Dell sales representative for information about this security feature.

NOTE: Computer tracking software may not be available in certain countries.

NOTE: If you have computer tracking software and your computer is lost or stolen, you must contact the company that provides the tracking service to report the missing computer.

About Smart Cards and Fingerprint Readers

NOTE: The smart card feature or fingerprint reader may not be available on your computer.

Smart cards are portable credit-card shaped devices with internal integrated circuits. The top surface of the smart card usually contains an embedded processor under the gold contact pad. The combination of the small size and integrated circuits make smart cards valuable tools for security, data storage, and

special programs. Using smart cards can improve computer security by combining something a user has (the smart card) with something only the user should know (a PIN) to provide more secure user-authentication than passwords alone.

The fingerprint reader is a device that you can use to help keep your Dell™ computer secure. The reader is a strip sensor located on a peripheral device for your computer. When you slide your finger over the reader, it uses your unique fingerprint to authenticate your user identity.

Password Protection

NOTICE: Although passwords provide security for the data on your computer, they are not foolproof. If your data requires more security, it is your responsibility to obtain and use additional forms of protection, such as data encryption programs.

System Password

NOTICE: If you leave your computer running and unattended without having a system password assigned, or if you leave your computer unlocked so that someone can disable the password by changing a jumper setting, anyone can access the data stored on your hard drive.

Option Settings

You cannot change or enter a new system password if either of the following two options is displayed:

- **Set** — A system password is assigned.
- **Disabled** — The system password is disabled by a jumper setting on the system board.

You can only assign a system password when the following option is displayed:

- **Not Set** — No system password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning a System Password

To escape from the field without assigning a system password, press <Tab> or the <Shift><Tab> key combination to move to another field, or press <Esc> at any time before you complete step 5.

1. Enter system setup (see "Entering System Setup" on page 280) and verify that **Password Status** is set to **Unlocked**.
2. Highlight **System Password**, and then press the left- or right-arrow key.

   The option heading changes to **Enter Password**, followed by an empty 32-character field in square brackets.
3. Type your new system password.

   You can use up to 32 characters. To erase a character when entering your password, press <Backspace> or the left-arrow key. The password is not case sensitive.

Certain key combinations are not valid. If you enter one of these combinations, the speaker emits a beep.

As you press each character key (or the spacebar for a blank space), a placeholder appears in the field.

4 Press <Enter>.

If the new system password is less than 32 characters, the whole field fills with placeholders. Then the option heading changes to **Verify Password**, followed by another empty 32-character field in square brackets.

5 To confirm your password, type it a second time and press <Enter>.

The password setting changes to **Set**.

6 Exit system setup.

Password protection takes effect when you restart the computer.

Typing Your System Password

When you start or restart your computer, the following prompt appears on the screen.

If **Password Status** is set to **Locked**:

```
Type the password and press <Enter>.
```

If you have assigned an administrator password, the computer accepts your administrator password as an alternate system password.

If you type a wrong or incomplete system password, the following message appears on the screen:

```
** Incorrect password. **
```

If you again type an incorrect or incomplete system password, the same message appears on the screen. The third and subsequent times you type an incorrect or incomplete system password, the computer displays the following message:

```
** Incorrect password. **
Number of unsuccessful password attempts: 3
System halted! Must power down.
```

Even after your computer is turned off and on, the previous message is displayed each time you type an incorrect or incomplete system password.

NOTE: You can use **Password Status** in conjunction with **System Password** and **Admin Password** to further protect your computer from unauthorized changes.

Deleting or Changing an Existing System Password

1 Enter system setup (see "Entering System Setup" on page 280).

2 Highlight **System Password** and press <Enter>.

3 When prompted, type the system password.

4 Press <Enter> twice to clear the existing system password. The setting changes to **Not Set**.

If **Not Set** is displayed, the system password is deleted. If **Not Set** is not displayed, press <Alt><b> to restart the computer, and then repeat steps 3 and 4.

5 To assign a new password, follow the procedure in "Assigning a System Password" on page 277.

6 Exit system setup.

Administrator Password

Option Settings

You cannot change or enter a new administrator password if either of the following two options is displayed:

- **Set** — An administrator password is assigned.
- **Disabled** — The administrator password is disabled by a jumper setting on the system board.

You can only assign an administrator password when the following option is displayed:

- **Not Set** — No administrator password is assigned and the password jumper on the system board is in the enabled position (the default setting).

Assigning an Administrator Password

The administrator **password** can be the same as the system password.

NOTE: If the two passwords are different, the administrator password can be used as an alternate system password. However, the system password cannot be used in place of the administrator password.

1 Enter system setup (see "Entering System Setup" on page 280) and verify that **Admin Password** is set to **Not Set.**

2 Highlight **Admin Password** and press the left- or right-arrow key.

The computer prompts you to type and verify the password. If a character is not permitted, the computer emits a beep.

3 Type and then verify the password.

After you verify the password, the **Admin Password** setting changes to **Set**. The next time you enter system setup, the computer prompts you for the administrator password.

4 Exit system setup.

A change to **Admin Password** becomes effective immediately (no need to restart the computer).

Operating Your Computer With an Administrator Password Enabled

When you enter system setup, the **Admin Password** option is highlighted, prompting you to type the password.

If you do not type the correct password, the computer lets you view, but not modify, system setup options.

NOTE: You can use **Password Status** in conjunction with **Admin Password** to protect the system password from unauthorized changes.

Deleting or Changing an Existing Administrator Password

To change an existing administrator password, you must know the administrator password.

1. Enter system setup (see "Entering System Setup" on page 280).
2. Type the administrator password at the prompt.
3. Highlight **Admin Password** and press the left- or right-arrow key to delete the existing administrator password.

   The setting changes to **Not Set**.

   To assign a new administrator password, perform the steps in "Assigning an Administrator Password" on page 279.
4. Exit system setup.

Disabling a Forgotten Password and Setting a New Password

To reset system and/or administrator passwords, see "Clearing Forgotten Passwords" on page 290.

System Setup

Overview

Use system setup as follows:

- To change the system configuration information after you add, change, or remove any hardware in your computer
- To set or change a user-selectable option such as the user password
- To read the current amount of memory or set the type of hard drive installed

Before you use system setup, it is recommended that you write down the system setup screen information for future reference.

Entering System Setup

1. Turn on (or restart) your computer.
2. When the blue DELL™ logo appears, press <F2> immediately.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop. Then shut down your computer (see "Turning Off Your Computer" on page 21) and try again.

System Setup Screens

The system setup screen displays current or changeable configuration information for your computer. Information on the screen is divided into three areas: the options list, active options field, and key functions.

Options List — This field appears on the left side of the system setup window. The field is a scrollable list containing features that define the configuration of your computer, including installed hardware, power conservation, and security features. Scroll up and down the list by using the up and down arrow keys. As an option is highlighted, the **Option Field** displays more information about that option and the option's current and available settings.	**Option Field** — This field contains information about each option. In this field you can view your current settings and make changes to your settings. Use the right- and left-arrow keys to highlight an option. Press <Enter> to make that selection active. **Key Functions** — This field appears below the **Option Field** and lists keys and their functions within the active system setup field.

System Setup Options

NOTE: Depending on your computer and installed devices, the items listed in this section may or may not appear.

System	
System Info	Lists the computer name, **BIOS Version**, **Service Tag**, **Express Service Code**, (if applicable), and the **Asset Tag**. None of these fields can be modified.
Processor Info	Identifies the CPU type, bus speed, clock speed, and L2 cache size. States whether the processor is hyperthreading and multiple-core capable and whether it supports 64-bit technology. None of these fields can be modified.
Memory Info	Lists the type, size, speed, channel mode (dual or single), and memory slot information of installed memory. For each populated memory slot, system setup lists the DIMM size, rank, type, and organization. Empty memory slots are denoted as "Empty." None of these fields can be modified.

PCI Info	Identifies any installed PCI or PCI Express cards. None of these fields can be modified.
Date/Time	Displays current date and time settings.
Boot Sequence	The computer attempts to boot from the sequence of devices specified in this list. This option allows you to control/modify the boot sequence (see "Boot Sequence" on page 287).

Drives	
Diskette Drive (**Internal** default)	This option enables or disables the floppy drive. The options are **Off**, **Internal**, **USB**, and **Read Only**. **NOTE:** If **USB** is selected, ensure that USB Controller setup option under Onboard Devices is set to **On**.
SATA 0 through SATA n	Identifies and enables and disables the drives attached to the SATA connectors on the system board and lists the capacities for the hard drives. **NOTE:** These options appear as **SATA 0** through **SATA 3** for the mini tower, **SATA 0** through **SATA 2** for the desktop, **SATA 0** and **SATA1** for the small form factor and ultra small form factor computers.
External SATA	Identifies and enables and disables the drives attached to the eSATA connector on the system board and lists the capacities for the hard drives. **NOTE:** This option is not available on the ultra small form factor computer.
SATA Operation (RAID Autodetect/AHCI default for mini-tower and desktop) (AHCI default for small form factor and ultra small form factor)	Options for Mini Tower and Desktop: • RAID Autodetect/AHCI (RAID if signed drives, otherwise AHCI) • RAID Autodetect/ATA (RAID if signed drives, otherwise ATA) • RAID On (SATA is configured for RAID on every boot) **NOTE:** When in Autodetect mode, the computer configures the drive as RAID if a RAID signature is detected on the drive. Otherwise the drive will be configured as AHCI or ATA. Options for Small Form Factor and Ultra Small Form Factor: • AHCI • ATA
SMART Reporting (**Off** default)	This setting determines whether integrated drive errors are reported or not during computer start-up.

Onboard Devices	
Integrated NIC (**On** default)	Enables or disables the integrated NIC controller. Settings are **On**, **Off**, or **On w/ PXE**. When the **On w/ PXE** setting is active, if a boot routine is not available from the network server, the computer attempts to boot from the next device in the boot sequence list.
Integrated Audio (**On** default)	Enables or disables the onboard audio controller.

USB Controller (**On** default)	Enables or disables the internal USB controller. **No Boot** enables the controller but disables the ability to boot from a USB device. **NOTE:** Operating systems with USB support will recognize USB floppy drives regardless of the No Boot setting.
Rear Quad/Triad USB (**On** default)	Enables or disables the upper USB ports on the back of the computer.
Rear Dual USB (**On** default)	Enables or disables the lower USB ports on the back of the computer.
Front USB (**On** default)	Enables or disables the front USB ports.
PCI Slots (**On** default)	Enables or disables all PCI and PCI Express slots.
LPT Port Mode (**PS/2** default)	Determines the mode of operation of the internal parallel port. **Off** disables the port. **AT** configures the port for AT compatibility. **PS/2** configures the port for PS/2 compatibility. **EPP** configures the port for the EPP bidirectional protocol. **ECP** configures the port for the ECP bidirectional protocol. **NOTE:** If you set the LPT Port Mode to ECP, the LPT Port DMA appears in the option menu.
LPT Port Address	Determines the address that the built-in parallel port uses.
Serial Port #1 (**Auto** default)	Determines how the serial port operates. **Auto**, the default setting, automatically configures a connector to a particular designation (**COM1** or **COM3**).
Serial Port #2 (**Auto** default)	Determines how the serial port operates. **NOTE:** Only available if a PS/2 serial port adapter is installed. **Auto**, the default setting, automatically configures a connector to a particular designation (**COM2** or **COM4**).

Video	
Primary Video (**Auto** default)	This setting specifies which video controller is primary, **Auto** or **Onboard/Card**. When Auto is selected, the add-in video controller will be used. **NOTE:** A PCI Express graphics card will override the integrated video controller.

Performance	
HyperThreading (**On** default)	The hyperthreading option is displayed if the installed processor supports hyperthreading. Determines whether the physical processor appears as one or two logical processors. The performance of some applications improves with additional logical processors. **On** enables hyperthreading.
Multiple CPU Core (**On** default)	Determines whether the processor will have one or two cores enabled. **On** enables the second core.
Virtualization (**Off** default)	Specifies whether a virtual machine monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization technology.
VT for Direct I/O	Specifies whether a Virtual Machine Monitor (VMM) can use the additional hardware capabilities provided by Intel Virtualization Technology for Direct IO. Default is Off.
Trusted Execution	Specifies whether a Measured Virtual Machine Monitor (MVMM) can use additional hardware capabilities provided by Intel Trusted Execution Technology. Default is Off.
Virtual Appliance	Specifies whether a Virtual Appliance can use the additional hardware capabilities provided by Intel Embedded Information Technology. Default is Off.
VA Config Lock	Specifies whether the Virtual Appliance ACPI Configuration Interface is locked or unlocked. This option has no effect when Virtual Appliance is disabled. Default is Unlocked.
SpeedStep (**Off** default)	Enables Intel® SpeedStep® for all supported processors in the computer. This setting changes the processor power consumption and frequency. **NOTE:** This option may not be available on your computer.
Limit CPUID Value (**Off** default)	Limits the max value the processor standard CPUID function will support. Some operating systems won't complete installation when the max CPUID function supported is greater than 3.
HDD Acoustic Mode (**Bypass** default)	• **Quiet** — The hard drive operates at its most quiet setting. • **Performance** — The hard drive operates at its maximum speed. • **Bypass** — Your computer does not test or change the current acoustics mode setting. • **Suggested** — The hard drive operates at the level suggested by the drive manufacturer. **NOTE:** Switching to performance mode may cause the drive to be noisier, but its performance is not affected. Changing the acoustics setting does not alter your hard drive image.

Security	
Unlock Setup	When an administrator password is being used, allows the user access to modify system setup settings. Enter the administrator password at the prompt to unlock system setup. If the correct password is not entered here, the user can view but not modify system setup fields.

Admin Password (**Not Set** default)	Displays the current status of your system setup program's password security feature and allows you to verify and assign a new admin password.
System Password (**Not Set** default)	Displays the current status of the computer's system password security feature and allows a new system password to be assigned and verified.
SATA *0-n* Password (**Not Set** default)	Displays the current status of the hard drive's password security feature and allows a new hard drive password to be assigned and verified.
Password Changes (**Unlocked** default)	Determines the interaction between the **System** password and the **Admin** password. **Locked** prevents a user without a valid **Admin** password from being able to modify the **System** password. **Unlocked** allows a user with a valid **System** password to modify the system password.
Chassis Intrusion (**On-Silent** default)	When enabled and the switch installed, this option alerts the user, during the next computer start-up, that the computer cover has been opened. The settings are **On**, **On-Silent** (default setting), and **Off**.
Intrusion Detected	Acknowledges and clears a chassis intrusion alert.
TPM Security (**Off** default)	Enables or disables the Trusted Platform Module security device.
TPM Activation (**Deactivate** default)	Activates or deactivates the Trusted Platform Module security device. The **Clear** option clears any data stored by a user that has previously activated and used TPM. **NOTE:** In order to activate Trusted Platform Module, the **TPM Security** option must be set to **On**.
Execute Disable (**On** default)	Enables or disables Execute Disable memory protection technology.
Computrace (**Deactivate** default)	Enables or disables the BIOS interface of the optional Computrace service from Absolute Software. This optional monitoring service must be purchased separately. **Activate** *permanently* enables the BIOS-Computrace interface. **Disable** *permanently* disables the BIOS-Computrace interface. **Deactivate** *temporarily* deactivates the BIOS-Computrace interface. **NOTE:** By activating service, you consent to transmission of data from your computer to the Computrace server.

Power Management	
AC Recovery (**Off** default)	Determines how the computer responds when AC power is re-applied after a power loss. **Off** commands the computer to stay off when the power is re-applied. You must press the front-panel power button before the computer turns on. **On** commands the computer to turn on when the power is re-applied. **Last** commands the computer to return to the last power state the computer was in just before it was turned off.

Auto Power On (**Off** default)	Sets the computer to automatically turn on. **Off** disables this feature. **Everyday** turns the computer on every day at the time set in **Auto Power Time**. **Weekdays** turns the computer on every day from Monday through Friday at the time set in **Auto Power Time**. **NOTE:** This feature does not work if you turn off your computer using the switch on a power strip or surge protector.
Auto Power Time	Sets time to automatically turn on the computer. Time is kept in the standard 12-hour format (*hours:minutes*). Change the startup time by pressing the right- or left-arrow key to increase or decrease the numbers, or type numbers in both the date and time fields.
Low Power Mode (**Off** default)	When **Low Power Mode** is selected, remote wakeup events will no longer power up the computer from **Hibernate** or **Off** via the onboard network controller.
Remote Wake-Up (**Off** default)	This option allows the computer to power up when a network interface controller or remote wakeup-capable modem receives a wake up signal. **On** is the default setting. **On w/ Boot to NIC** will allow the computer to attempt to boot from a network prior to using the boot sequence. **NOTE:** Normally, the computer can be powered up remotely from suspend mode, hibernate mode, or when powered off. When **Low Power Mode** (in the **Power Management** menu) is enabled, the computer can only be powered up remotely from **Suspend**.
Suspend Mode (**S3** default)	Sets the computer's suspend mode. The options are **S1**, a suspend state in which the computer is running in a low-power mode, and **S3**, a suspend state in which the power is reduced or turned off for many components, however, system memory remains active.

Maintenance	
Service Tag	Displays the service tag for your computer.
SERR Message (**On** default)	Some graphics cards require that the SERR message be disabled.
Load Defaults	Restores system setup options to their factory defaults.
Event Log	Allows you to view the **Event Log**. Entries are marked **R** for **Read** and **U** for **Unread**. **Mark All Entries Read** puts an **R** to the left of all the entries. **Clear Log** clears the **Event Log**.

POST Behavior	
Fastboot (**On** default)	When enabled, this feature reduces computer startup time by bypassing some compatibility steps. **Off** does not skip any steps during computer startup. **On** starts the computer more quickly.

Numlock Key (**On** default)	Determines the functionality of the numeric keys on the right side of your keyboard. **Off** commands the right keypad keys to function as arrows. **On** commands the right keypad keys to function as numbers.
POST Hotkeys (**Setup & Boot Menu** default)	Determines whether the sign-on screen displays a message stating the keystroke sequence that is required to enter the **Setup** program or the **Quickboot** feature. **Setup & Boot Menu** displays both messages (F2=Setup and F12=Boot Menu). **Setup** displays the setup message only (F2=Setup). **Boot Menu** displays the **Quickboot** message only (F12=Boot Menu). **None** displays no message.
MEBx Hotkey	Specifies whether the sign on screen displays a message stating the keystroke sequence required to enter the MEBx setup program. Default is on.
Keyboard Errors (**Report** default)	When set to **Report** (enabled) and an error is detected during POST, the BIOS will display the error message and prompt you to press <F1> to continue or press <F2> to enter system setup. When set to **Do Not Report** (disabled) and an error is detected during POST, the BIOS will display the error message and continue booting the computer.

Boot Sequence

This feature allows you to change the boot sequence for devices.

Option Settings

- **USB Device —** The computer attempts to boot from the USB device. If no operating system is present, the computer generates an error message.
- **Onboard or USB Floppy Drive —** The computer attempts to boot from the floppy drive. If the floppy disk in the drive is not bootable, or if no floppy disk is in the drive, the computer generates an error message.
- **Onboard SATA Hard Drive** — The computer attempts to boot from the primary serial ATA hard drive. If no operating system is on the drive, the computer generates an error message.
- **Onboard or USB CD-ROM Drive** — The computer attempts to boot from the CD drive. If no CD is in the drive, or if the CD has no operating system, the computer generates an error message.
- **Onboard Network Controller** — The computer attempts to boot from the network controller. If no operating system is present, the computer generates an error message.

Changing Boot Sequence for the Current Boot

You can use this feature, for example, to tell the computer to boot from the CD drive so that you can run the Dell Diagnostics on the *Drivers and Utilities* media, but you want the computer to boot from the hard drive when the diagnostic tests are complete. You can also use this feature to restart your computer to a USB device such as a floppy drive, memory key, or CD drive.

NOTE: If you are booting to a USB floppy drive, you must first set the floppy drive to USB in system setup (see "System Setup" on page 280).

1. If you are booting to a USB device, connect the USB device to a USB connector.
2. Turn on (or restart) your computer.
3. When `F2 = Setup, F12 = Boot Menu` appears in the upper-right corner of the screen, press <F12>.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop. Then shut down your computer (see "Turning Off Your Computer" on page 21) and try again.

   The **Boot Device Menu** appears, listing all available boot devices. Each device has a number next to it.
4. At the bottom of the menu, enter the number of the device that is to be used for the current boot only.

   For example, if you are booting to a USB memory key, highlight **USB Device** and press <Enter>.

   NOTE: To boot to a USB device, the device must be bootable. To make sure your device is bootable, check the device documentation.

Changing Boot Sequence for Future Boots

1. Enter system setup (see "Entering System Setup" on page 280).
2. Use the arrow keys to highlight the **Boot Sequence** menu option and press <Enter> to access the pop-up menu.

   NOTE: Write down your current boot sequence in case you want to restore it.
3. Press the up- and down-arrow keys to move through the list of devices.
4. Press the spacebar to enable or disable a device. (Enabled devices have a checkmark.)
5. Press <Shift><Up Arrow> or <Shift><Down Arrow> to move a selected device up or down the list.

Booting to a USB Device

NOTE: To boot to a USB device, the device must be bootable. To ensure that your device is bootable, check the device documentation.

Memory Key

1. Insert the memory key into a USB port and restart the computer.
2. When `F12 = Boot Menu` appears in the upper-right corner of the screen, press <F12>.

   The BIOS detects the device and adds the USB device option to the boot menu.
3. From the boot menu, select the number that appears next to the USB device.

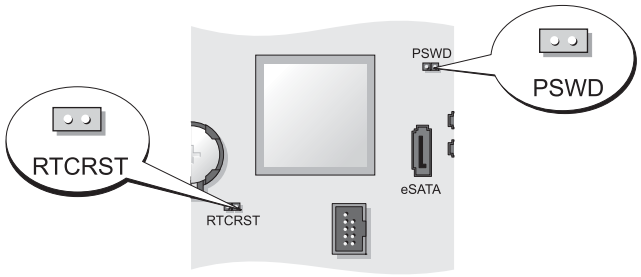
   The computer boots to the USB device.

Floppy Drive

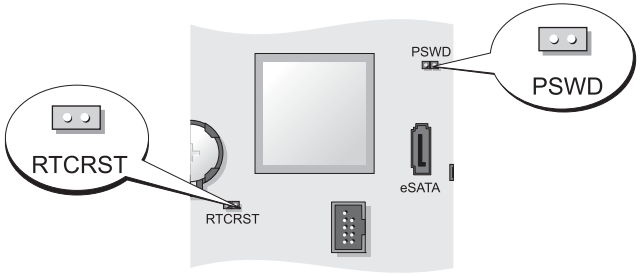
1. In system setup, set the **Diskette Drive** option to **USB**.
2. Save and exit system setup.
3. Connect the USB floppy drive, insert a bootable floppy, and re-boot the computer.

Jumper Settings

Mini Tower and Desktop



Small Form Factor



Jumper	Setting	Description
PSWD		Password features are enabled (default setting).
		Password features are disabled.
RTCRST		The real-time clock has not been reset.
		The real-time clock is being reset (jumpered temporarily).

jumpered *unjumpered*

Clearing Forgotten Passwords

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

NOTICE: This process erases both the system and administrator passwords.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover.
3. Locate the 2-pin password jumper (PSWD) on the system board, and remove the jumper to clear the password. See "Jumper Settings" on page 289.
4. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

5 Connect your computer and monitor to electrical outlets, and turn them on.

6 After the Microsoft® Windows® desktop appears on your computer, shut down your computer (see "Turning Off Your Computer" on page 21).

7 Turn off the monitor and disconnect it from the electrical outlet.

8 Disconnect the computer power cable from the electrical outlet, and press the power button to ground the system board.

9 Open the computer cover.

10 Locate the 2-pin password jumper on the system board and attach the jumper to reenable the password feature.

11 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

12 Connect your computer and devices to electrical outlets, and turn them on.

NOTE: This procedure enables the password feature. When you enter system setup (see "Entering System Setup" on page 280), both system and administrator password options appear as **Not Set**—meaning that the password feature is enabled but no password is assigned.

13 Assign a new system and/or administrator password.

Clearing CMOS Settings

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover.

3 Reset the current CMOS settings:

   a Locate the password (PSWD) and CMOS (RTC_RST) jumpers on the system board (see "Jumper Settings" on page 289).

   b Remove the password jumper plug from its pins.

   c Place the password jumper plug on the RTC_RST pins and wait approximately 5 seconds.

   d Remove the jumper plug from the RTC_RST pins and place it back on the password pins.

4 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

5 Connect your computer and devices to electrical outlets, and turn them on.

Hyperthreading and Multi-Core Technology

Hyperthreading is an Intel technology that can enhance overall computer performance by allowing one physical processor to function as two logical processors that are capable of performing certain tasks simultaneously. Multi-core processors contain two or more physical computational units inside a single CPU package, thereby increasing computing efficiency and multi-tasking ability. Intel has implemented this technology in its Dual-Core and Quad-Core processors. These processors have two and four computational units respectively. It is recommended that you use the Microsoft Windows XP Service Pack 1 (SP1) or higher or Windows Vista operating systems which are optimized to take advantage of these technologies.

While many programs can benefit from hyperthreading and multi-core technology, some programs may have not been optimized for them and may require an update from the software manufacturer. Contact the software manufacturer for updates and information about using hyperthreading or multi-core technology with your software. To determine if your computer is using hyperthreading technology, check the system setup option for hyperthreading under the Performance tab (see "System Setup" on page 280).

Power Management for Windows XP and Windows Vista

Options in Windows XP

The Microsoft Windows XP power management features can reduce the amount of electricity your computer uses when it is on and you are not using it. You can reduce power to just the monitor or the hard drive, or you can use standby mode or hibernate mode to reduce power to the entire computer. When the computer exits from a power conservation mode, it returns to the operating state it was in prior to entering the mode.

NOTE: Windows XP Professional includes security and networking features not available in Windows XP Home Edition. When a Windows XP Professional computer is connected to a network, different options related to security and networking appear in certain windows.

NOTE: The procedures to activate the standby and hibernate modes may vary according to your operating system.

Standby Mode

Standby mode conserves power by turning off the display and the hard drive after a designated period of time, known as a time-out. When the computer exits from standby mode, it returns to the operating state it was in prior to entering standby mode.

NOTICE: If your computer loses power while in standby mode, it may lose data.

To set standby mode to automatically activate after a defined period of inactivity:

1. Click **Start**→ **Control Panel**→ **Pick a category**→ **Performance and Maintenance**.
2. Under **or pick a Control Panel icon**, click **Power Options**.

To immediately activate standby mode without a period of inactivity, click **Start→ Turn Off Computer→ Stand by**.

To exit from standby mode, press a key on the keyboard or move the mouse.

Hibernate Mode

Hibernate mode conserves power by copying system data to a reserved area on the hard drive, and then completely turning off the computer. When the computer exits from hibernate mode, the desktop is restored to the state it was in prior to entering hibernate mode.

To activate hibernate mode:

1. Click **Start→ Control Panel→ Pick a category→ Performance and Maintenance**.
2. Under **or pick a Control Panel icon**, click **Power Options**.
3. Define your hibernate settings on the **Power Schemes** tab, **Advanced** tab, and **Hibernate** tab.

To exit from hibernate mode**,** press the power button. The computer may take a short time to exit from hibernate mode. Because the keyboard and mouse do not function in hibernate mode, pressing a key on the keyboard or moving the mouse does not bring the computer out of hibernation.

Because hibernate mode requires a special file on your hard drive with enough disk space to store the contents of the computer memory, Dell creates an appropriately sized hibernate mode file before shipping the computer to you. If the computer's hard drive becomes corrupted, Windows XP recreates the hibernate file automatically.

Power Options Properties

Define your standby mode settings, hibernate mode settings, and other power settings in the **Power Options Properties** window. To access the **Power Options Properties** window:

1. Click **Start→ Control Panel→ Pick a category→ Performance and Maintenance**.
2. Under **or pick a Control Panel icon**, click **Power Options**.
3. Define your power settings on the **Power Schemes** tab, **Advanced** tab, and **Hibernate** tab as described in the following sections.

Power Schemes Tab

Each standard power setting is called a scheme. If you want to select one of the standard Windows schemes installed on your computer, choose a scheme from the **Power schemes** drop-down menu. The settings for each scheme appear in the fields below the scheme name. Each scheme has different settings for starting standby mode, hibernate mode, turning off the monitor, and turning off the hard drive.

NOTICE: If you set the hard drive to time-out before the monitor does, your computer may appear to be locked up. To recover, press any key on the keyboard or click the mouse. To avoid this problem, always set the monitor to time-out before the hard drive.

The **Power schemes** drop-down menu displays the following schemes:

- **Always On** (default) — If you want to use your computer with no power conservation.
- **Home/Office Desk** — If you want your home or office computer to run with little power conservation.
- **Portable/Laptop** — If your computer is a portable computer that you use for traveling.
- **Presentation** — If you want your computer to run without interruption (using no power conservation).
- **Minimal Power Management** — If you want your computer to run with minimal power conservation.
- **Max Battery** — If your computer is a portable computer and you run your computer from batteries for extended periods of time.

If you want to change the default settings for a scheme, click the drop-down menu in the **Turn off monitor**, **Turn off hard disks**, **System stand by**, or **System hibernates** field, and then select a time-out from the displayed list. Changing the time-out for a scheme field permanently changes the default settings for that scheme, unless you click **Save As** and enter a new name for the changed scheme.

Advanced Tab

The **Advanced** tab allows you to:

- Place the power options icon in the Windows task bar for quick access.
- Set the computer to prompt you for your Windows password before the computer exits from standby mode or hibernate mode.
- Program the power button to activate standby mode, activate hibernate mode, or turn off the computer.

To program these functions, click an option from the corresponding drop-down menu and click **OK**.

Hibernate Tab

The **Hibernate** tab allows you to enable hibernate mode. If you want to use the hibernate settings as defined on the **Power Schemes** tab, click the **Enable hibernate support** check box on the **Hibernate** tab.

For more information on power management options:

1. Click **Start**→ **Help and Support**→ **Performance and maintenance**.
2. In the **Performance and maintenance** window, click **Conserving power on your computer**.

Options in Windows Vista

The Microsoft Vista power management features can reduce the amount of electricity your computer uses when it is on and you are not using it. You can reduce power to just the monitor or the hard drive, or you can use sleep mode or hibernate mode to reduce power to the entire computer. When the computer exits from a power conservation mode, it returns to the operating state it was in prior to entering the mode.

Sleep Mode

Sleep mode conserves power by turning off the display and the hard drive after a predetermined period of inactivity (a time-out). When the computer exits sleep mode, it returns to the same operating state it was in before entering sleep mode.

To enter sleep mode in Windows Vista, click **Start**, click the arrow in the lower-right corner of the Start menu, and then click **Sleep**.

To exit sleep mode, press a key on the keyboard or move the mouse.

Hibernate Mode

Hibernate mode conserves power by copying system data to a reserved area on the hard drive and then completely turning off the computer. When the computer exits hibernate mode, it returns to the same operating state it was in before entering hibernate mode.

To manually enter hibernate mode in Windows Vista, click **Start**, click the arrow in the lower-right corner of the Start menu, and then click **Hibernate**.

Configuring Power Management Settings

You can use the Windows Power Options Properties to configure the power management settings on your computer.

To access Power Options Properties, click **Start** → **Control Panel**→ **System and Maintenance**→ **Power Options**.

About RAID Configurations

This section provides an overview of the RAID configuration that you may have selected when you purchased your computer. A number of RAID configurations are available in the computer industry for different types of uses. Your Dell computer supports RAID level 0 and RAID level 1. A RAID level 0 configuration is recommended for high-performance programs, while RAID level 1 is recommended for users that desire a high level of data integrity.

NOTE: RAID levels do not represent a hierarchy. A RAID level 1 configuration is not inherently better or worse than a RAID level 0 configuration.

The Intel® RAID controller on your computer can only create a RAID level configuration using two physical drives. The drives should be the same size to ensure that the larger drive does not contain unallocated (and therefore unusable) space.

NOTE: If you purchased your Dell computer with RAID, your computer has been configured with two hard drives that are the same size.

Verifying That RAID Is Working

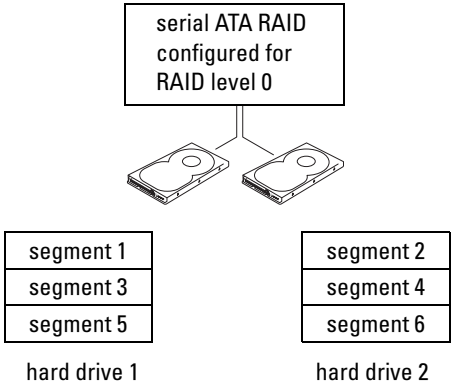
Your computer displays information pertaining to your RAID configuration at start-up, before loading the operating system. If RAID is not configured, the message `none defined` appears under **RAID Volumes**, followed by a list of the physical drives installed in your computer. If a RAID volume is identified, you can then check the **Status** field to determine the current state of your RAID configuration. The **Status** field contains information about the following conditions:

- **Normal** — Your RAID configuration is functioning properly.
- **Degraded** — One of your hard drives has failed. The computer is still bootable; however, RAID is not functioning and data is not being copied to the other drive.
- **Rebuild** — Following a degraded condition, the computer has detected the replacement/connection of a secondary hard drive and will automatically restore the RAID configuration the next time the operating system loads.

RAID Level 0

NOTICE: Because a RAID level 0 configuration provides no data redundancy, a failure of one drive results in the loss of all data. To protect your data when using a RAID level 0 configuration, perform regular backups.

RAID level 0 uses a storage technique known as *data striping* to provide a high data-access rate. Data striping is a method of writing consecutive segments, or *stripes*, of data sequentially across the physical drive(s) to create a large virtual drive. Data striping allows one of the drives to read data while the other drive is searching for and reading the next block.

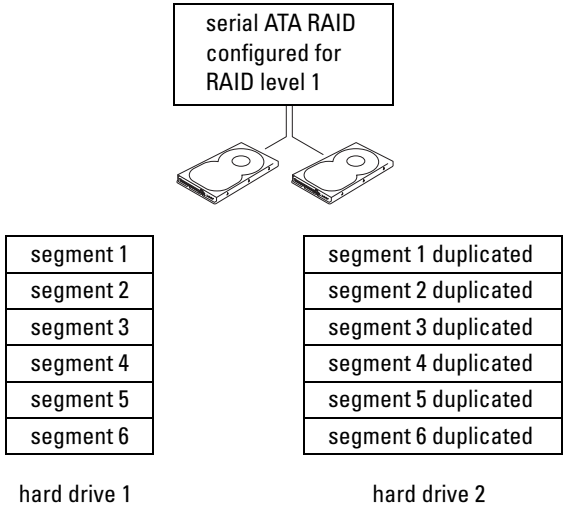


Another advantage of a RAID level 0 configuration is that it utilizes the full storage capacities of the drives. For example, two 120-GB hard drives combine to provide 240 GB of hard drive space on which to store data.

NOTE: In a RAID level 0 configuration, the size of the configuration is equal to the size of the smallest drive multiplied by the number of drives in the configuration.

RAID Level 1 Configuration

RAID level 1 uses a data-redundancy storage technique known as *mirroring* to enhance data integrity. When data is written to the primary drive, the data is also duplicated, or *mirrored*, on the second drive in the configuration.



If a drive failure occurs, subsequent read and write operations are directed to the surviving drive. A replacement drive can then be rebuilt using the data from the surviving drive.

NOTE: In a RAID level 1 configuration, the size of the configuration is equal to the size of the smallest drive in the configuration.

Configuring Your Computer for RAID

You can use one of two methods to configure RAID hard drive volumes. One method uses the Intel RAID Option ROM utility and can be performed without an operating system present on the hard drive. The second method uses the Intel Matrix Storage Manager, or Intel Matrix Storage Console, and is performed *after* the operating system and the Intel Matrix Storage Console have been installed. Both methods require that you set your computer to RAID-enabled mode before you begin.

Setting Your Computer to RAID-Enabled Mode

1. Enter system setup (see "System Setup" on page 280).
2. Press the up- and down-arrow keys to highlight **Drives**, and press <Enter>.
3. Press the up- and down-arrow keys to highlight **SATA Operation**, and press <Enter>.
4. Press the left- and right-arrow keys to highlight **RAID On**, press <Enter>, and then press <Esc>.

NOTE: For more information about RAID options, see "System Setup Options" on page 281.

5 Press the left- and right-arrow keys to highlight **Save/Exit**, and press <Enter> to exit system setup and resume the boot process.

Configuring Your Computer for RAID Using the Intel RAID Option ROM Utility

NOTE: Although any size of drives may be used to create a RAID configuration when using the Intel RAID Option ROM utility, ideally the drives should be of equal size. In a RAID level 0 configuration, the size of the configuration will be the size of the smallest drive multiplied by the number of drives in the configuration (two). In a RAID level 1 configuration, the size of the configuration will be the smaller of the two drives used.

Creating a RAID Level 0 Configuration

NOTICE: You lose any data on your hard drives when you create a RAID configuration using the following procedure. Back up data that you want to keep before continuing.

NOTE: Use the following procedure only if you are reinstalling your operating system. Do not use the following procedure to migrate an existing storage configuration to RAID level 0 configuration.

1 Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).

2 Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.

3 Press the up- and down-arrow keys to highlight **Create RAID Volume**, and press <Enter>.

4 Enter a RAID volume name or accept the default, and press <Enter>.

5 Press the up- and down-arrow keys to select **RAID0(Stripe)**, and press <Enter>.

NOTE: Select the stripe size closest to the size of the average file that you want to store on the RAID volume. If you do not know the average file size, choose 128 KB as your stripe size.

6 Press the up- and down-arrow keys to change the stripe size and press <Enter>.

7 Select the desired capacity for the volume and press <Enter>. The default value is the maximum available size.

8 Press <Enter> to create the volume.

9 Press <y> to confirm that you want to create the RAID volume.

10 Confirm that the correct volume configuration is displayed on the main Intel RAID Option ROM utility screen.

11 Press the up- and down-arrow keys to select **Exit** and press <Enter>.

12 Install the operating system (see "Restoring Your Operating System" on page 359).

Creating a RAID Level 1 Configuration

1 Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).

2 Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.

3 Use the up- and down-arrow keys to highlight **Create RAID Volume** and press <Enter>.

4 Enter a RAID volume name or accept the default and press <Enter>.

5 Use the up- and down-arrow keys to select **RAID1(Mirror)** and press <Enter>.

6 Select the desired capacity for the volume, and press <Enter>. The default value is the maximum available size.

7 Press <Enter> to create the volume.

8 Press <y> to confirm that you want to create the RAID volume.

9 Confirm that the correct volume configuration is displayed on the main Intel RAID Option ROM utility screen.

10 Use the up- and down-arrow keys to select **Exit**, and press <Enter>.

11 Install the operating system (see "Restoring Your Operating System" on page 359).

Configuring Your Computer for RAID Using the Intel Matrix Storage Manager

If you already have one hard drive with the operating system installed on it, and you want to add a second hard drive and reconfigure both drives into a RAID volume without losing the existing operating system and any data, you need to use the migrating option for a RAID level 0 configuration (see "Migrating to a RAID Level 0 Configuration" on page 301) or a RAID level 1 configuration (see "Migrating to a RAID Level 1 Configuration" on page 301). Create a RAID level 0 volume or RAID level 1 volume only when:

- You are adding a new drive to an existing single-drive computer (and the operating system is on the single drive), and you want to configure the drives into a RAID volume.
- You already have a two-hard drive computer configured into a volume, but you still have some space left on the volume that you want to designate as a second RAID volume.

Creating a RAID Level 0 Configuration

NOTE: When you perform this operation, all data on the RAID drives will be lost.

1 Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).

2 Click **Start** and point to **Programs→ Intel(R) Matrix Storage Manager→ Intel Matrix Storage Console** to launch the Intel Storage Utility.

NOTE: If you do not see an **Actions** menu option, you have not yet set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).

3 On the **Actions** menu, select **Create RAID Volume** to launch the Create RAID Volume Wizard, and then click **Next**.

4 On the **Select Volume Location** screen, click the first hard drive you want to include in your RAID level 0 volume, and then click the right arrow.

5 Click a second hard drive. To add a third hard drive in your RAID level 0 volume, click the right arrow and click the third drive until three drives appear in the **Selected** window, and then click **Next**.

6 In the **Specify Volume Size** window, click the **Volume Size** desired, and then click **Next**.

7 Click **Finish** to create the volume, or click **Back** to make changes.

Creating a RAID Level 1 Configuration

NOTE: When you perform this operation, all data on the RAID drives is lost.

1 Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).

2 Click the **Start** button and point to **Programs→ Intel(R) Matrix Storage Manager→ Intel Matrix Storage Console** to launch the Intel® Storage Utility.

NOTE: If you do not see an **Actions** menu option, you have not yet set your computer to RAID-enabled mode.

3 On the **Actions** menu, select **Create RAID Volume** to launch the Create RAID Volume Wizard.

4 Click **Next** at the first screen.

5 Confirm the volume name, select **RAID 1** as the RAID level, and then click **Next** to continue.

6 On the **Select Volume Location** screen, click the first hard drive you want to use to create your RAID level 1 volume, and then click the right arrow. Click a second hard drive until two drives appear in the **Selected** window, and then click **Next**.

7 In the **Specify Volume Size** window, select the **Volume Size** desired and click **Next**.

8 Click **Finish** to create the volume, or click **Back** to make changes.

9 Follow Microsoft Windows procedures for creating a partition on the new RAID volume.

Recovering From a Single Hard Drive Failure (RAID 1) Using the Intel Matrix Storage Manager

NOTE: Perform the following steps only after you have replaced the failed hard drive (see the appropriate "Drives" section for your computer).

1 Turn on or restart your computer.

2 Press <Ctrl><i> when you are prompted to enter the Intel RAID Option ROM utility.

3 Under **DEGRADED VOLUME DETECTED**, confirm that the new (non-RAID) drive is listed and then press <Enter>.

4 Under **Disk/Volume Information** confirm that the volume status is *Rebuild*.

NOTE: Volumes with a status of *Rebuild* are rebuilt within the operating system.

5 Use the up- and down-arrow keys to select **Exit**, and then press <Enter>.

Your computer boots to the operating system and begins rebuilding the RAID volume automatically. A dialog box appears and displays the progress of the rebuild.

NOTE: You can use your computer while the computer is rebuilding the RAID level 1 volume.

Migrating to a RAID Level 0 Configuration

1. Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).
2. Click the **Start** button and point to **All Programs→ Intel(R) Matrix Storage Manager→ Intel Matrix Storage Console** to launch the Intel Storage Utility.

NOTE: If you do not see an **Actions** menu option, you have not yet set your computer to RAID-enabled mode.

3. On the **Actions** menu, select **Create RAID Volume From Existing Hard Drive** to launch the Migration Wizard.
4. Click **Next** on the Migration Wizard screen.
5. Enter a RAID volume name or accept the default.
6. From the drop-down box, select **RAID 0** as the RAID level.

NOTE: Select the stripe size closest to the size of the average file you want to store on the RAID volume. If you do not know the average file size, choose 128 KB as your stripe size.

7. Select the appropriate stripe size from the drop-down box, and then click **Next**.

NOTE: Select the hard drive that you want to use as your source hard drive (it should be the hard drive containing the data or operating system files that you want to keep on the RAID volume).

8. On the **Select Source Hard Drive** screen, double-click the hard drive from which you want to migrate, and click **Next**.
9. On the **Select Member Hard Drive** screen, double-click the hard drive(s) to select the member drive(s) to span the stripe array, and click **Next**.
10. On the **Specify Volume Size** screen, select the **Volume Size** you want, and click **Next**.

NOTE: In step 11, all data contained on the member drive removed.

11. Click **Finish** to start migrating, or click **Back** to make changes. You can use your computer normally during the migration process.

Migrating to a RAID Level 1 Configuration

1. Set your computer to RAID-enabled mode (see "Setting Your Computer to RAID-Enabled Mode" on page 297).
2. Click the **Start** button and point to **All Programs→ Intel(R) Matrix Storage Manager→ Intel Matrix Storage Console** to launch the Intel Storage Utility.

NOTE: If you do not see an **Actions** menu option, you have not yet set your computer to RAID-enabled mode.

3. On the **Actions** menu, click **Create RAID Volume From Existing Hard Drive** to launch the Migration Wizard.
4. Click **Next** on the first Migration Wizard screen.
5. Enter a RAID volume name or accept the default.

6 From the drop-down box, select **RAID 1** as the RAID level.

NOTE: Select the hard drive that you want to use as your source hard drive (it should be the hard drive containing the data or operating system files that you want to keep on the RAID volume).

7 On the **Select Source Hard Drive** screen, double-click the hard drive from which you want to migrate, and click **Next**.

8 On the **Select Member Hard Drive** screen, double-click the hard drive to select the member drive that you want to act as the mirror in the configuration, and click **Next**.

9 On the **Specify Volume Size** screen, select the volume size you want, and click **Next**.

NOTE: In step 10, all data contained on the member drive is removed.

10 Click **Finish** to start migrating, or click **Back** to make changes. You can use your computer normally during migration process.

Battery

Replacing the Battery

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

A coin-cell battery maintains computer configuration, date, and time information. The battery can last several years.

The battery may need replacing if an incorrect time or date is displayed during the boot routine along with a message such as:

```
Time-of-day not set - please run SETUP program
```

or

```
Invalid configuration information -
please run SETUP program
```

or

```
Strike the F1 key to continue,
F2 to run the setup utility
```

To determine whether you need to replace the battery, reenter the time and date in system setup and exit the program to save the information. Turn off your computer and disconnect it from the electrical outlet for a few hours; then reconnect the computer, turn it on, and enter system setup (see "Entering System Setup" on page 280). If the date and time are not correct in system setup, replace the battery.

You can operate your computer without a battery; however, without a battery, the configuration information is erased if the computer is turned off or unplugged from the electrical outlet. In this case, you must enter system setup (see "Entering System Setup" on page 280) and reset the configuration options.

CAUTION: A new battery can explode if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

To remove the battery:

1. If you have not already done so, make a copy of your configuration information, found in system setup.
2. Follow the procedures in "Before You Begin" on page 21.
3. Remove the computer cover.
4. Locate the battery socket.

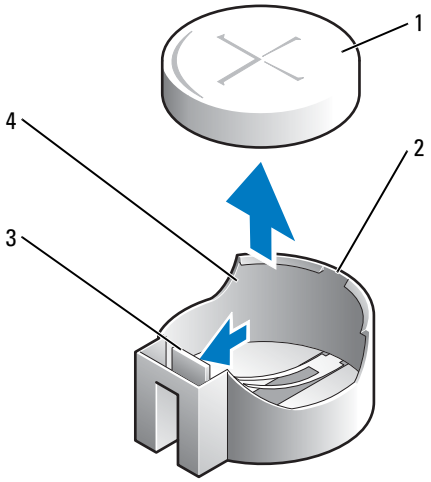
NOTICE: If you pry the battery out of its socket with a blunt object, be careful not to touch the system board with the object. Ensure that the object is inserted between the battery and the socket before you attempt to pry out the battery. Otherwise, you may damage the system board by prying off the socket or by breaking circuit traces on the system board.

NOTICE: To avoid damage to the battery connector, you must firmly support the connector while removing the battery.

5 Remove the system battery.

a Support the battery connector by pressing down firmly on the positive side of the connector.

b While supporting the battery connector, press the battery tab away from the positive side of the connector and pry the battery it up out of the securing tabs at the negative side of the connector.



1 system battery
2 positive side of battery connector
3 battery socket tab
4 battery socket

6 Install the new system battery.

a Support the battery connector by pressing down firmly on the positive side of the connector.

b Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.

c Press the battery straight down into the connector until it snaps into place.

7 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

8 Enter system setup (see "Entering System Setup" on page 280) and restore the settings you recorded in step 1.

9 Properly dispose of the old battery as described in the *Product Information Guide*.

Replacing the System Board

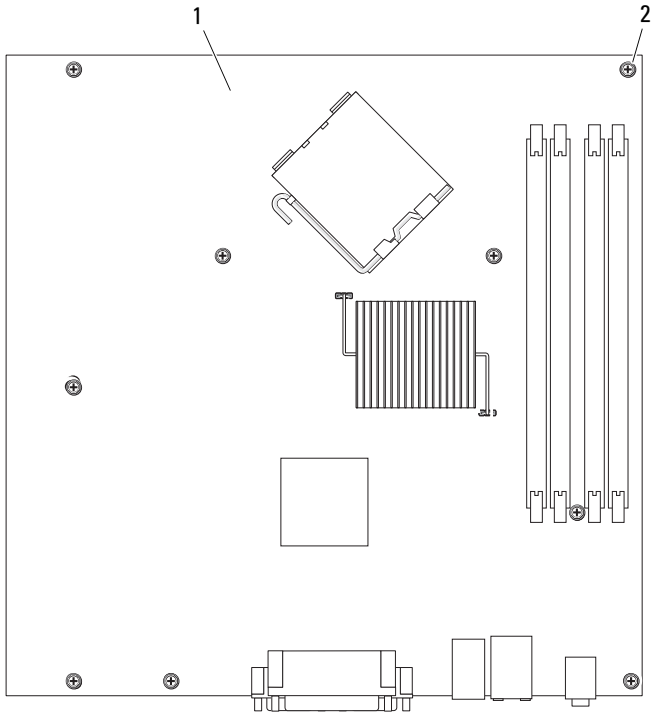
Removing the System Board: Mini Tower, Desktop, Small Form Factor, and Ultra Small Form Factor Computers

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

3. Remove any components that restrict access to the system board (optical drive[s], floppy drive, hard drive, I/O panel (as applicable).
4. Remove the processor and heat sink assembly:
   - Mini tower: see "Processor" on page 73
   - Desktop: see "Processor" on page 149
   - Small form factor: see "Processor" on page 213
   - Ultra small form factor: see "Processor" on page 261
5. Disconnect all cables from the system board.
6. Remove the screws from the system board.
   - Mini tower: remove the heat sink bracket and the screws indicated in "Mini Tower System Board Screws" on page 308
   - Desktop: see "Desktop System Board Screws" on page 309
   - Small form factor: see "Small Form Factor System Board Screws" on page 310
   - Ultra small form factor: see "Ultra Small Form Factor System Board Screws" on page 311
7. Slide the system board assembly toward the front of the computer, and then lift the board up and away.

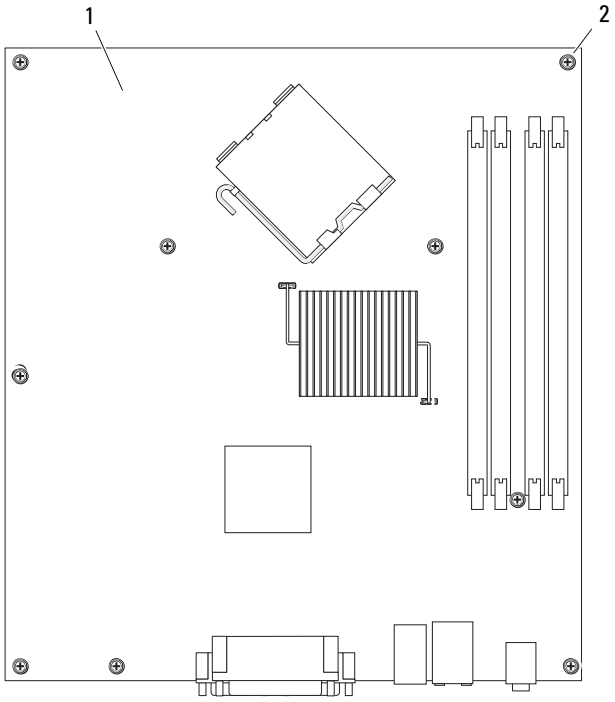
Mini Tower System Board Screws



1 mini tower system board

2 screws (9)

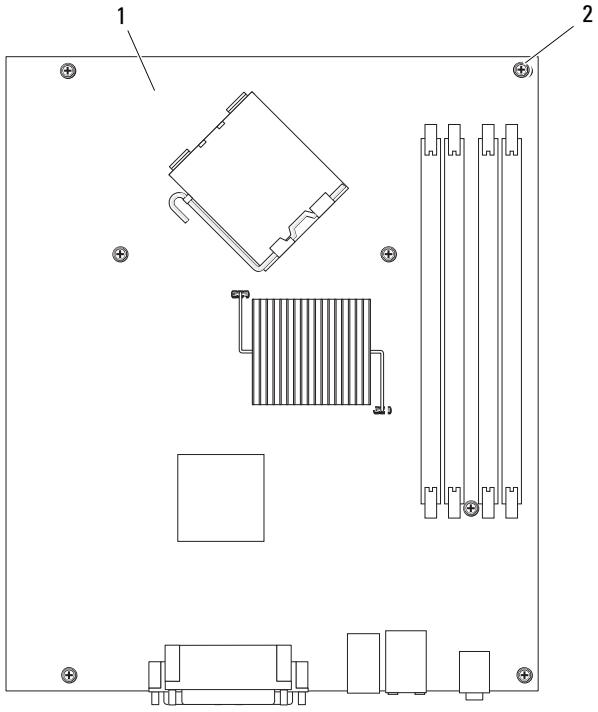
Desktop System Board Screws



1 desktop system board

2 screws (9)

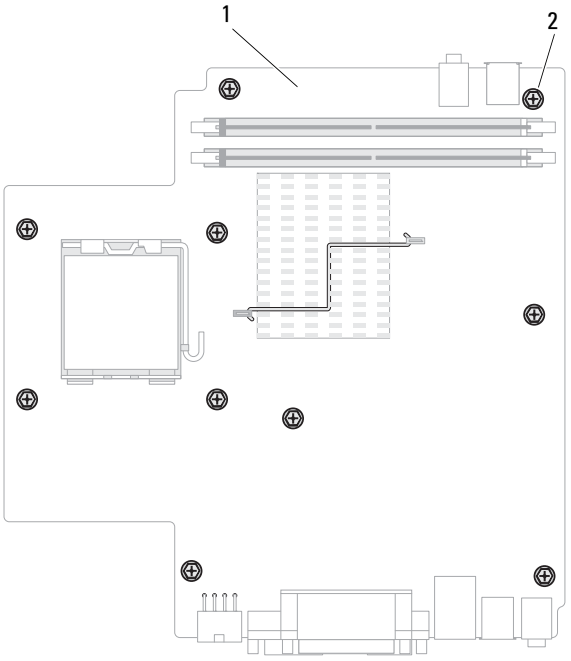
Small Form Factor System Board Screws



1 small form factor system board

2 screws (7)

Ultra Small Form Factor System Board Screws



1 ultra small form factor system board

2 screws (10)

Place the system board assembly that you just removed next to the replacement system board to ensure it is identical.

Replacing the System Board: Mini Tower, Desktop, Small Form Factor, and Ultra Small Form Factor Computers

1. Gently align the board into the chassis and slide it toward the back of the computer.
2. Replace the screws on the system board.
3. Replace any components and cables that you removed from the system board.
4. Reconnect all cables to their connectors at the back of the computer.
5. Replace the computer cover (see "Replacing the Computer Cover" on page 317).

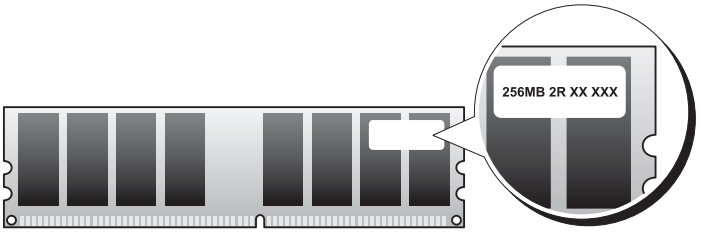
Memory

You can increase your computer memory by installing memory modules on the system board.

Your computer supports DDR2 memory. For additional information on the type of memory supported by your computer, see the appropriate specifications for your system in this book.

DDR2 Memory Overview

- When installed in pairs, DDR2 memory modules should be of *matched memory size and speed*. If the DDR2 memory modules are not installed in matched pairs, the computer will continue to operate, but with a slight reduction in performance. See the label on the upper-right or upper-left corner of the module to determine the module's capacity.



NOTE: Always install DDR2 memory modules in the order indicated on the system board.

The recommended memory configurations are:

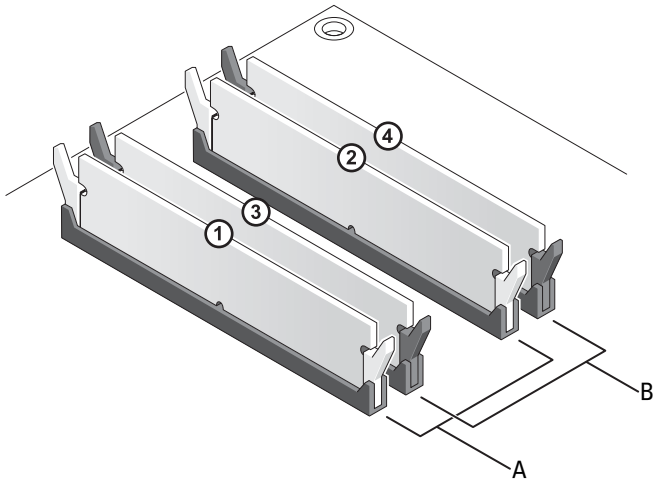
– A pair of matched memory modules installed in DIMM connectors 1 and 2

or

– A pair of matched memory modules installed in DIMM connectors 1 and 2 and another matched pair installed in DIMM connectors 3 and 4

NOTICE: Do not install ECC memory modules.

- If you install mixed pairs of PC2-5300 (DDR2 667-MHz) and PC2-6400 (DDR2 800-MHz) memory, the modules function at the speed of the slowest module installed.
- Be sure to install a single memory module in DIMM connector 1, the connector closest to the processor, before you install modules in any other connector.



A matched pair of modules in DIMM connectors 1 and 2 (white securing clips)

B matched pair of memory modules in DIMM connectors 3 and 4 (black securing clips)

NOTICE: If you remove your original memory modules from the computer during a memory upgrade, keep them separate from any new modules that you may have, even if you purchased the new modules from Dell. If possible, do not pair an original memory module with a new memory module. Otherwise, your computer may not start properly. You should install your original memory modules in pairs either in DIMM connectors 1 and 2 or DIMM connectors 3 and 4.

NOTE: Memory purchased from Dell is covered under your computer warranty.

Addressing Memory Configurations

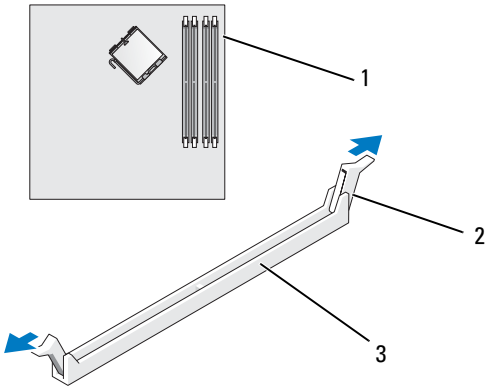
If you are using a 32-bit operating system such as Microsoft® Windows® Vista®, your computer will support a maximum of 4 GB of memory. If you are using a 64-bit operating system, your computer will support a maximum of 8 GB (2-GB DIMMs in each of the four slots) of memory.

Installing Memory

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

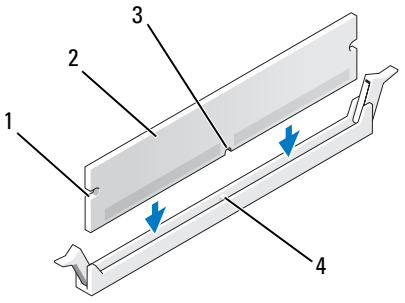
NOTICE: To avoid electrostatic discharge and damage to internal components, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface on the computer chassis.

1. Follow the procedures in "Before You Begin" on page 21.
2. Remove the computer cover (see "Removing the Computer Cover" for your specific computer).
3. Press out the securing clip at each end of the memory module connector.



1	memory connector closest to processor	2	securing clips (2)	3	memory connector

4 Align the notch on the bottom of the module with the crossbar in the connector.

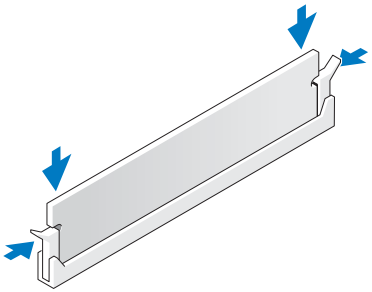


1	cutouts (2)	2	memory module	3	notch
4	crossbar				

NOTICE: To avoid damage to the memory module, press the module straight down into the connector while you apply equal force to each end of the module.

5 Insert the module into the connector until the module snaps into position.

If you insert the module correctly, the securing clips snap into the cutouts at each end of the module.



6 Replace the computer cover (see "Replacing the Computer Cover" on page 317).

NOTICE: To connect a network cable, first plug the cable into the network port or device and then plug it into the computer.

7 Connect your computer and devices to electrical outlets, and turn them on.

8 When the message appears stating that memory size has changed, press <F1> to continue.

9 Log on to your computer.

10 Right-click the **My Computer** icon on your Windows desktop and click **Properties**.

11 Click the **General** tab.

12 To verify that the memory is installed correctly, check the amount of memory (RAM) listed.

Removing Memory

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To avoid electrostatic discharge and damage to internal components, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface on the computer chassis.

1 Follow the procedures in "Before You Begin" on page 21.

2 Remove the computer cover (see "Removing the Computer Cover" for your specific computer).

3 Press out the securing clip at each end of the memory module connector.

4 Grasp the module and pull up.

If the module is difficult to remove, gently ease the module back and forth to remove it from the connector.

Replacing the Computer Cover

Mini-Tower, Desktop, and Small Form Factor Computers

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

1. Ensure that all cables are connected, and fold cables out of the way.

   Gently pull the power cables toward you so that they do not get caught underneath the drives.
2. Ensure that no tools or extra parts are left inside the computer.
3. To replace the cover:
   a. Align the bottom of the cover with the hinge tabs located along the bottom edge of the computer.
   b. Using the hinge tabs as leverage, rotate the cover downward to close it.
   c. Snap the cover into place by pulling back on the cover release latch and then releasing the latch when the cover is properly seated.
   d. Ensure that the cover is seated correctly before moving the computer.

NOTICE: To connect a network cable, first plug the cable into the network wall jack and then plug it into the computer.

4. Attach the computer stand (if applicable). For instructions, see the documentation that came with the stand.
5. Connect your computer and devices to electrical outlets, and turn them on.

   After you remove and replace the cover, the chassis intrusion detector (optional on some computers), if installed and enabled, causes the following message to appear on the screen at the next computer start-up:

   ```
   ALERT! Cover was previously removed.
   ```
6. Reset the chassis intrusion detector in "System Setup" on page 280 by changing **Chassis Intrusion** to **On** or **On-Silent**.

NOTE: If an administrator password has been assigned by someone else, contact your network administrator for information on resetting the chassis intrusion detector.

Ultra Small Form Factor Computers

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer chassis.

1 Follow the procedures in "Before You Begin" on page 21.

NOTICE: Before touching anything inside your computer, ground yourself by touching an unpainted metal surface. While you work, periodically touch an unpainted metal surface to dissipate any static electricity that could harm internal components.

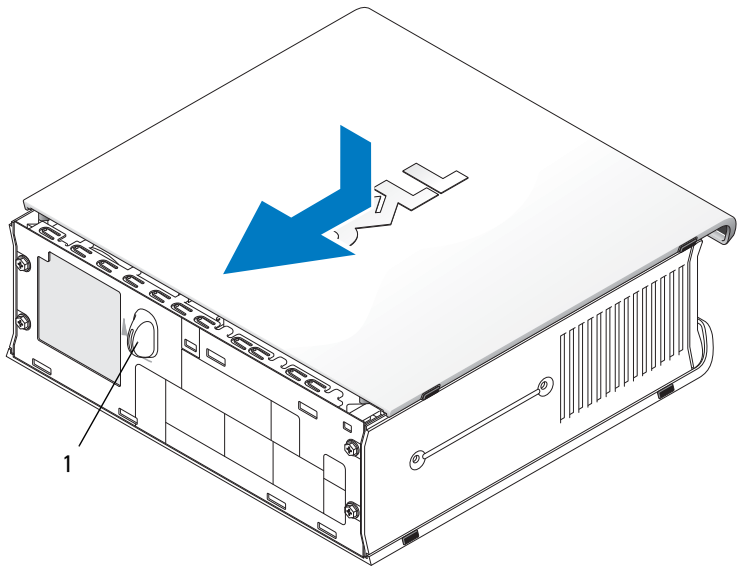
2 If applicable, remove the cable cover (see "Cable Cover (Optional)" on page 237).

3 Replace the computer cover:

a Tilting the cover slightly, align it with the retaining strip at the back of the system.

b Slide the computer cover backward until it snaps into place.

CAUTION: Graphics card heat sinks can become very hot during normal operation. Ensure that a graphics card heat sink has had sufficient time to cool before you touch it.



1 release knob

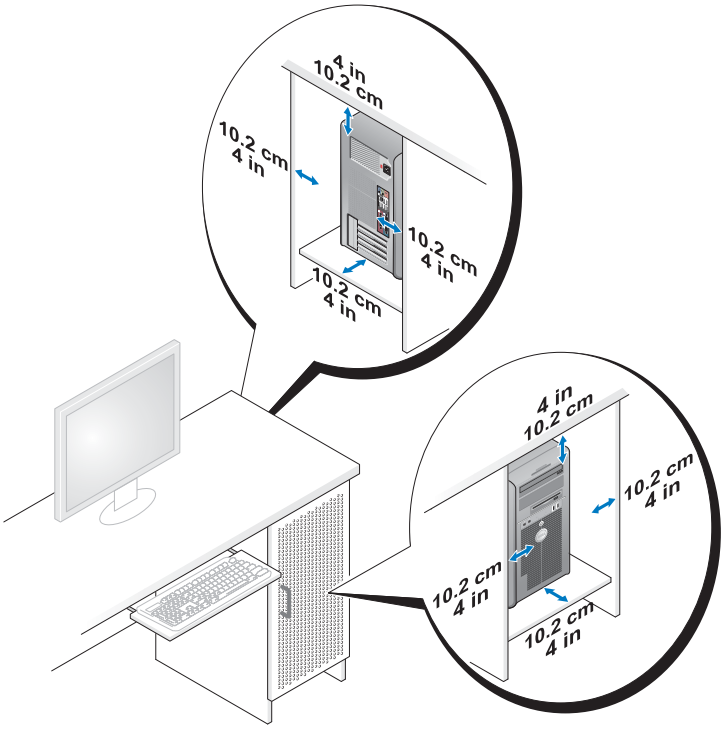
Installing Your Computer in an Enclosure

Installing your computer in an enclosure can restrict the airflow and impact your computer's performance, possibly causing it to overheat. Use the following guidelines when installing your computer in an enclosure.

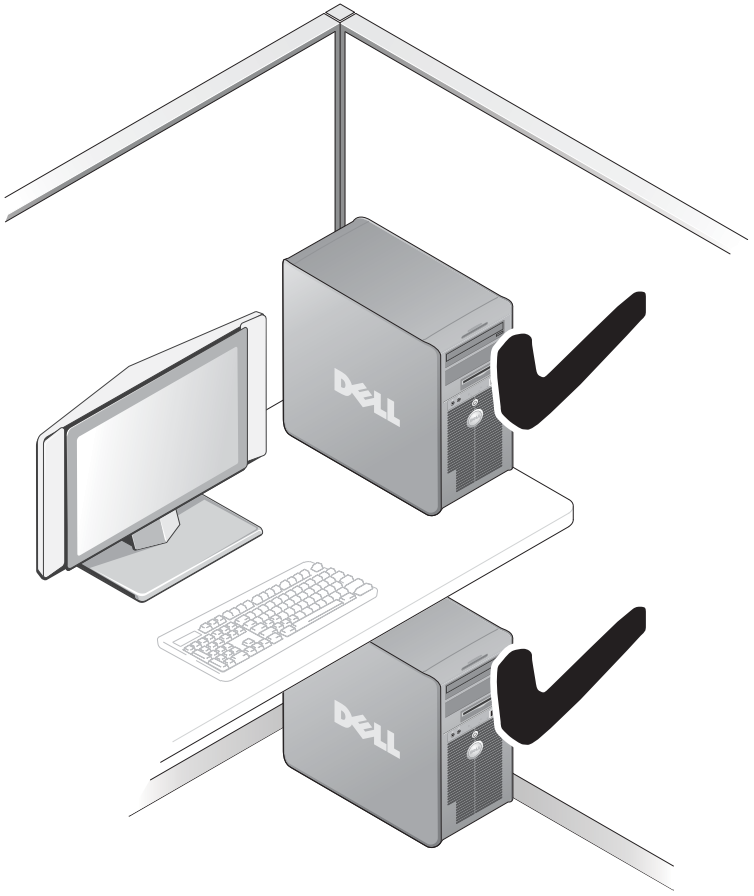
NOTICE: The operating temperature specifications indicated in this guide reflect the maximum ambient operating temperature. The room's ambient temperature needs to be a consideration when installing your computer in an enclosure. For example, if the ambient room temperature is at 25° C (77° F), depending on your computer's specifications, you only have 5° to 10° C (9° to 18° F) temperature margin before you reach your computer's maximum operating temperature. For details about your computer's specifications:

- For a mini tower computer, see "Mini Tower Computer Specifications" on page 35.
- For a desktop computer, see "Desktop Computer Specifications" on page 97.
- For a small form factor computer, see "Small Form Factor Computer Specifications" on page 175.
- For an ultra small form factor computer, see "Ultra Small Form Factor Computer Specifications" on page 241.

- Leave a 10.2-centimeter (4-inch) minimum clearance on all vented sides of the computer to permit the airflow required for proper ventilation.
- If your enclosure has doors, they need to be of a type that allows at least 30% airflow through the enclosure (front and back).


4 in
10.2 cm
10.2 cm
4 in
10.2 cm
4 in
10.2 cm
4 in
4 in
10.2 cm
10.2 cm
4 in
10.2 cm
4 in
10.2 cm
4 in

- If your computer is installed in a corner on a desk or under a desk, leave at least 5.1 centimeters (2 inch) of clearance from the back of the computer to the wall to permit the airflow required for proper ventilation.



- Do not install your computer in an enclosure that does not allow airflow. Restricting the airflow impacts your computer's performance, possibly causing it to overheat.

Cleaning Your Computer

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

Computer, Keyboard, and Monitor

CAUTION: Before you clean your computer, disconnect the computer from the electrical outlet. Clean your computer with a soft cloth dampened with water. Do not use liquid or aerosol cleaners, which may contain flammable substances.

- Use a can of compressed air to remove dust from between the keys on the keyboard.

NOTICE: To prevent damage to the antiglare coating, do not wipe the display with soap or alcohol.

- To clean your monitor screen, lightly dampen a soft, clean cloth with water. You can also use a special screen-cleaning tissue or solution suitable for the monitor's antistatic coating.
- Wipe the keyboard, computer, and monitor plastics with a soft cleaning cloth moistened with a solution of three parts water and one part dishwashing detergent.

  Do not soak the cloth or let water drip inside your computer or keyboard.

Mouse

NOTICE: Disconnect the mouse from the computer before cleaning the mouse.

If your screen cursor skips or moves abnormally, clean the mouse.

Cleaning a Non-Optical Mouse

1. Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.
2. Turn the retainer ring on the underside of your mouse counterclockwise, and then remove the ball.
3. Wipe the ball with a clean, lint-free cloth.
4. Blow carefully into the ball cage or use a can of compressed air to dislodge dust and lint.
5. If the rollers inside the ball cage are dirty, clean the rollers with a cotton swab moistened lightly with isopropyl alcohol.
6. Recenter the rollers in their channels if they are misaligned. Ensure that fluff from the swab is not left on the rollers.
7. Replace the ball and retainer ring, and turn the retainer ring clockwise until it clicks into place.

Cleaning an Optical Mouse

Clean the outside casing of the mouse with a cloth moistened with a mild cleaning solution.

Floppy Drive

NOTICE: Do not attempt to clean drive heads with a swab. You might accidentally misalign the heads which prevents the drive from operating.

Clean your floppy drive using a commercially available cleaning kit. These kits contain pretreated floppy disks to remove contaminants that accumulate during normal operation.

CDs and DVDs

If you notice problems, such as skipping, with the playback quality of your CDs or DVDs, try cleaning the discs.

1. Hold the disc by its outer edge. You can also touch the inside edge of the center hole.

NOTICE: To avoid damaging the surface, do not wipe in a circular motion around the disc.

2. With a soft, lint-free cloth, gently wipe the bottom of the disc (the unlabeled side) in a straight line from the center to the outer edge of the disc.

   For stubborn dirt, try using water or a diluted solution of water and mild soap. You can also purchase commercial products that clean discs and provide some protection from dust, fingerprints, and scratches. Cleaning products for CDs are also safe to use on DVDs.

Microsoft® Windows® Features

Transferring Information to a New Computer

You can use your operating system "wizards" to help you transfer files and other data from one computer to another—for example, from an *old* computer to a *new* computer. For instructions, see the following section that corresponds to the operating system that your computer is running.

Microsoft® Windows® XP

The Microsoft Windows XP operating system provides the Files and Settings Transfer Wizard to move data from a source computer to a new computer. You can transfer data, such as:

- E-mail messages
- Toolbar settings
- Window sizes
- Internet bookmarks

You can transfer the data to the new computer over a network or serial connection, or you can store it on removable media, such as a writable CD, for transfer to the new computer.

NOTE: You can transfer information from an old computer to a new computer by directly connecting a serial cable to the input/output (I/O) ports of the two computers. To transfer data over a serial connection, you must access the Network Connections utility from the Control Panel and perform additional configuration steps, such as setting up an advanced connection and designating the host computer and the guest computer.

For instructions on setting up a direct cable connection between two computers, see Microsoft Knowledge Base Article #305621, titled *How to Set Up a Direct Cable Connection Between Two Computers in Windows XP*. This information may not be available in certain countries.

For transferring information to a new computer, you must run the Files and Settings Transfer Wizard. You can use the optional *Operating System* media for this process or you can create a wizard disk with the Files and Settings Transfer Wizard.

Running the Files and Settings Transfer Wizard With the Operating System Media

NOTE: This procedure requires the *Operating System* media. This media is optional and may not be included with certain computers.

To prepare a new computer for the file transfer:

1. Open the Files and Settings Transfer Wizard: click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **Files and Settings Transfer Wizard**.
2. When the **Files and Settings Transfer Wizard** welcome screen appears, click **Next**.
3. On the **Which computer is this?** screen, click **New Computer**→ **Next**.

4. On the **Do you have a Windows XP CD?** screen, click **I will use the wizard from the Windows XP CD→ Next**.
5. When the **Now go to your old computer** screen appears, go to your old or source computer. Do *not* click **Next** at this time.

To copy data from the old computer:

1. On the old computer, insert the Windows XP *Operating System* media.
2. On the **Welcome to Microsoft Windows XP** screen, click **Perform additional tasks**.
3. Under **What do you want to do?**, click **Transfer files and settings→ Next**.
4. On the **Which computer is this?** screen, click **Old Computer→ Next**.
5. On the **Select a transfer method** screen, click the transfer method you prefer.
6. On the **What do you want to transfer?** screen, select the items you want to transfer and click **Next**.

   After the information has been copied, the **Completing the Collection Phase** screen appears.
7. Click **Finish**.

To transfer data to the new computer:

1. On the **Now go to your old computer** screen on the new computer, click **Next**.
2. On the **Where are the files and settings?** screen, select the method you chose for transferring your settings and files and click **Next**.

   The wizard reads the collected files and settings and applies them to your new computer.

   When all of the settings and files have been applied, the **Finished** screen appears.
3. Click **Finished** and restart the new computer.

Running the Files and Settings Transfer Wizard Without the Operating System Media

To run the Files and Settings Transfer Wizard without the *Operating System* media, you must create a wizard disk that will allow you to create a backup image file to removable media.

To create a wizard disk, use your new computer with Windows XP and perform the following steps:

1. Open the Files and Settings Transfer Wizard: click **Start→ All Programs→ Accessories→ System Tools→ Files and Settings Transfer Wizard**.
2. When the **Files and Settings Transfer Wizard** welcome screen appears, click **Next**.
3. On the **Which computer is this?** screen, click **New Computer→ Next**.
4. On the **Do you have a Windows XP CD?** screen, click **I want to create a Wizard Disk in the following drive→ Next.**
5. Insert the removable media, such as a writable CD, and click **OK**.

6 When the disk creation completes and the `Now go to your old computer` message appears, *do not* click **Next**.

7 Go to the old computer.

To copy data from the old computer:

1 On the old computer, insert the wizard disk.

2 Click **Start**→ **Run**.

3 In the **Open** field on the **Run** window, browse to the path for **fastwiz** (on the appropriate removable media) and click **OK**.

4 On the **Files and Settings Transfer Wizard** welcome screen, click **Next**.

5 On the **Which computer is this?** screen, click **Old Computer**→ **Next**.

6 On the **Select a transfer method** screen, click the transfer method you prefer.

7 On the **What do you want to transfer?** screen, select the items you want to transfer and click **Next**.

After the information has been copied, the **Completing the Collection Phase** screen appears.

8 Click **Finish**.

To transfer data to the new computer:

1 On the **Now go to your old computer** screen on the new computer, click **Next**.

2 On the **Where are the files and settings?** screen, select the method you chose for transferring your settings and files and click **Next**. Follow the instructions on the screen.

The wizard reads the collected files and settings and applies them to your new computer.

When all of the settings and files have been applied, the **Finished** screen appears.

3 Click **Finished** and restart the new computer.

NOTE: For more information about this procedure, search **support.dell.com** for document #154781 (*What Are The Different Methods To Transfer Files From My Old Computer To My New Dell™ Computer Using the Microsoft® Windows® XP Operating System?*).

NOTE: Access to the Dell™ Knowledge Base document may not be available in certain countries.

Microsoft Windows Vista®

1 Click the Windows Vista Start button, , and then click **Transfer files and settings**→ **Start Windows Easy Transfer.**

2 In the **User Account Control** dialog box, click **Continue**.

3 Click **Start a new transfer** or **Continue a transfer in progress**.

Follow the instructions provided on the screen by the Windows Easy Transfer wizard.

Setting Up a Home and Office Network

Connecting to a Network Adapter

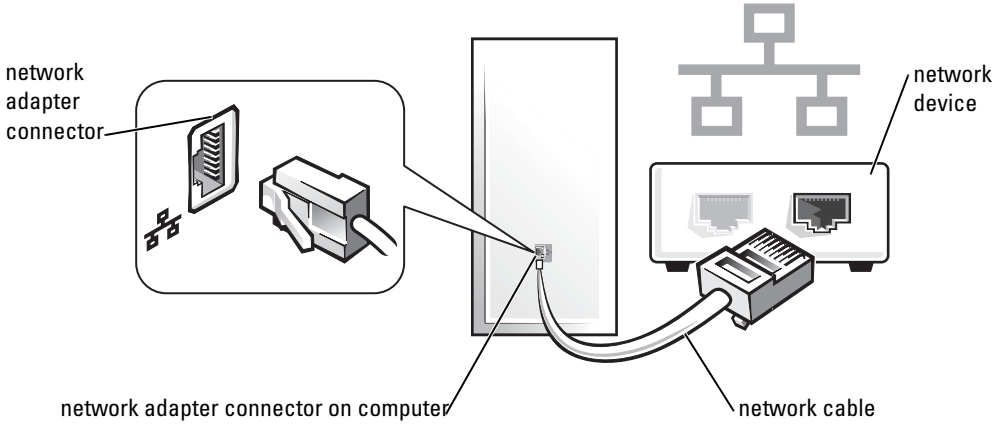
To connect a network cable:

NOTE: Plug the network cable into the network adapter connector on the computer. Do not plug the network cable into the modem connector on the computer. Do not plug a network cable into a telephone wall jack.

1. Connect the network cable to the network adapter connector on the back of your computer.

   Insert the cable until it clicks into place, and then gently pull it to ensure that it is secure.

2. Connect the other end of the network cable to a network device.



Network Setup

Windows XP

The Microsoft® Windows® XP operating system provides a Network Setup Wizard to guide you through the process of sharing files, printers, or an Internet connection between computers in a home or small office.

1. Click the **Start** button, point to **All Programs**→ **Accessories**→ **Communications**, and then click **Network Setup Wizard**.
2. On the **Network Setup Wizard** welcome screen, click **Next**.
3. Click **Checklist for creating a network**.

NOTE: Selecting the connection method **This computer connects directly to the Internet** enables the integrated firewall provided with Windows XP Service Pack 1 (SP1) or later.

4 Complete the checklist and required preparations.

5 Return to the Network Setup Wizard and follow the instructions on the screen.

Windows Vista

To make changes to your network setup in Microsoft® Windows Vista®:

1 Click the Windows Vista Start button, , and then click **Network→ Network and Sharing Center.**

2 Click **Set up a connection or network**.

3 Select the type of network connection you want to make and follow the instructions on the screen.

4 When finished, close the Network and Sharing Center.

Troubleshooting

Follow these tips when you troubleshoot your computer:

- If you added or removed a part before the problem started, review the installation procedures and ensure that the part is correctly installed.
- If a peripheral device does not work, ensure that the device is properly connected.
- If an error message appears on the screen, write down the exact message. This message may help support personnel diagnose and fix the problem(s).
- If an error message occurs in a program, see the program's documentation.

NOTE: The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell™ computer to the Windows Classic view.

Battery Problems

CAUTION: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

REPLACE THE BATTERY — If you have to repeatedly reset time and date information after turning on the computer, or if an incorrect time or date displays during start-up, replace the battery (see "Replacing the Battery" on page 303). If the battery still does not work properly, contact Dell (see "Contacting Dell" on page 370).

Card Problems

Fill out the "Diagnostics Checklist" on page 369 as you complete these checks.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CAUTION: To guard against electrical shock, always unplug your computer from the electrical outlet before opening the cover.

NOTICE: To prevent static damage to components inside your computer, discharge static electricity from your body before you touch any of your computer's electronic components. You can do so by touching an unpainted metal surface on the computer.

Drive Problems

CHECK THE CARD SEATING AND CABLE —

1. Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see the appropriate "Removing the Computer Cover" section for your computer).
2. Ensure that each card is firmly seated in its connector. Reseat any loose cards.
3. Ensure that all cables are firmly connected to their corresponding connectors on the cards. If any cables appear loose, reconnect them.

   For instructions on which cables should be attached to specific connectors on a card, see the card's documentation.
4. Close the computer cover reconnect the computer and devices to electrical outlets, and then turn them on (see "Replacing the Computer Cover" on page 317).

TEST THE GRAPHICS CARD —

1. Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see the appropriate "Removing the Computer Cover" section).
2. Remove all cards except the graphics card. See the appropriate "Cards" section for your computer.

   If your primary hard drive is connected to a drive controller card and not to one of the system board IDE connectors, leave the drive controller card installed in the computer.
3. Close the computer cover (see "Replacing the Computer Cover" on page 317), reconnect the computer and devices to electrical outlets, and then turn them on.
4. Run the Dell Diagnostics. See "Dell Diagnostics" on page 353.

TEST THE CARDS —

1. Turn off the computer and devices, disconnect them from their electrical outlets, wait 10 to 20 seconds, and then remove the computer cover (see the appropriate "Removing the Computer Cover" section for your computer).
2. Reinstall one of the cards that you removed previously. See see appropriate "Cards" section for your computer.
3. Close the computer cover, reconnect the computer and devices to electrical outlets, and then turn them on (see "Replacing the Computer Cover" on page 317).
4. Run the Dell Diagnostics. See "Dell Diagnostics" on page 353.

   If any of the tests fail, the card you just reinstalled is faulty and needs to be replaced.
5. Repeat this process until you have reinstalled all cards.

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

ENSURE THAT MICROSOFT® WINDOWS® RECOGNIZES THE DRIVE —

Windows XP:

- Click **Start** and click **My Computer**.

Windows Vista®:

- Click the Windows Vista Start button and click **Computer**.

If the drive is not listed, perform a full scan with your antivirus software to check for and remove viruses. Viruses can sometimes prevent Windows from recognizing the drive.

TEST THE DRIVE —

- Insert another disc to eliminate the possibility that the original drive is defective.
- Insert a bootable floppy disk and restart the computer.

CLEAN THE DRIVE OR DISK — See "Cleaning Your Computer" on page 323.

CHECK THE CABLE CONNECTIONS

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358.

RUN THE DELL DIAGNOSTICS — See "Dell Diagnostics" on page 353.

Optical drive problems

NOTE: High-speed optical drive vibration is normal and may cause noise, which does not indicate a defect in the drive or the media.

NOTE: Because of different regions worldwide and different disc formats, not all DVD titles work in all DVD drives.

ADJUST THE WINDOWS VOLUME CONTROL —

- Click the speaker icon in the lower-right corner of your screen.
- Ensure that the volume is turned up by clicking the slidebar and dragging it up.
- Ensure that the sound is not muted by clicking any boxes that are checked.

CHECK THE SPEAKERS AND SUBWOOFER — See "Sound and Speaker Problems" on page 342.

Problems writing to an optical drive

CLOSE OTHER PROGRAMS — The optical drive must receive a steady stream of data during the writing process. If the stream is interrupted, an error occurs. Try closing all programs before you write to the optical.

TURN OFF STANDBY MODE IN WINDOWS BEFORE WRITING TO A DISC — See "Power Management for Windows XP and Windows Vista" on page 292 or search for the keyword *standby* in Windows Help and Support for information on power management modes.

Hard drive problems

RUN CHECK DISK —

Windows XP:

1. Click **Start** and click **My Computer**.
2. Right-click **Local Disk C:**.

3 Click **Properties**→ **Tools**→ **Check Now**.

4 Click **Scan for and attempt recovery of bad sectors** and click **Start**.

Windows Vista:

1 Click **Start** and click **Computer**.

2 Right-click **Local Disk C:**.

3 Click **Properties**→ **Tools**→ **Check Now**.

The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue the desired action.

4 Follow the instructions on the screen.

E-Mail, Modem, and Internet Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTE: Connect the modem to an analog telephone jack only. The modem does not operate while it is connected to a digital telephone network.

NOTE: Do not plug a telephone cable into the network adapter connector (see the I/O connector information for your computer).

CHECK THE MICROSOFT OUTLOOK® EXPRESS SECURITY SETTINGS — If you cannot open your e-mail attachments:

1 In Outlook Express, click **Tools**→ **Options**→ **Security**.

2 Click **Do not allow attachments** to remove the checkmark, as needed.

CHECK THE TELEPHONE LINE CONNECTION
CHECK THE TELEPHONE JACK
CONNECT THE MODEM DIRECTLY TO THE TELEPHONE WALL JACK
USE A DIFFERENT TELEPHONE LINE —

- Verify that the telephone line is connected to the jack on the modem (the jack has either a green label or a connector-shaped icon next to it).
- Ensure that you hear a click when you insert the telephone line connector into the modem.
- Disconnect the telephone line from the modem and connect it to a telephone, then listen for a dial tone.
- If you have other telephone devices sharing the line, such as an answering machine, fax machine, surge protector, or line splitter, bypass them and use the telephone to connect the modem directly to the telephone wall jack. If you are using a line that is 3 meters (10 feet) or more in length, try a shorter one.

RUN THE MODEM DIAGNOSTIC TOOL —

Windows XP:

1 Click **Start**→ **All Programs**→ **Modem Helper**.

2 Follow the instructions on the screen to identify and resolve modem problems. Modem Helper is not available on certain computers.

Windows Vista:

1 Click **Start** → **All Programs**→ **Modem Diagnostic Tool**.

2 Follow the instructions on the screen to identify and resolve modem problems. Modem diagnostics are not available on all computers.

VERIFY THAT THE MODEM IS COMMUNICATING WITH WINDOWS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **Phone and Modem Options**→ **Modems**.

2 Click the COM port for your modem→ **Properties**→ **Diagnostics**→ **Query Modem** to verify that the modem is communicating with Windows.

If all commands receive responses, the modem is operating properly.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Phone and Modem Options**→ **Modems**.

2 Click the COM port for your modem→ **Properties** → **Diagnostics**→ **Query Modem** to verify that the modem is communicating with Windows.

If all commands receive responses, the modem is operating properly.

ENSURE THAT YOU ARE CONNECTED TO THE INTERNET — Ensure that you have subscribed to an Internet provider. With the Outlook Express e-mail program open, click **File**. If **Work Offline** has a checkmark next to it, click the checkmark to remove it and connect to the Internet. For help, contact your Internet service provider.

Error Messages

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

If the error message is not listed, see the documentation for the operating system or the program that was running when the message appeared.

A FILENAME CANNOT CONTAIN ANY OF THE FOLLOWING CHARACTERS: \ / : * ? " < > | — Do not use these characters in filenames.

A REQUIRED .DLL FILE WAS NOT FOUND — The program that you are trying to open is missing an essential file. To remove and then reinstall the program:

Windows XP:

1 Click **Start**→ **Control Panel**→ **Add or Remove Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Programs**→ **Programs and Features**.

2 Select the program you want to remove.

3 Click **Uninstall**.

4 See the program documentation for installation instructions.

***drive letter*:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY —** The drive cannot read the disk. Insert a disk into the drive and try again.

INSERT BOOTABLE MEDIA — Insert a bootable floppy disk, CD, or DVD.

NON-SYSTEM DISK ERROR — Remove the floppy disk from the floppy drive and restart your computer.

NOT ENOUGH MEMORY OR RESOURCES. CLOSE SOME PROGRAMS AND TRY AGAIN — Close all windows and open the program that you want to use. In some cases, you may have to restart your computer to restore computer resources. If so, run the program that you want to use first.

OPERATING SYSTEM NOT FOUND — Contact Dell (see "Contacting Dell" on page 370).

Keyboard Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CHECK THE KEYBOARD CABLE —

- Ensure that the keyboard cable is firmly connected to the computer.
- Shut down the computer (see "Before Working Inside Your Computer" on page 21), reconnect the keyboard cable as shown on the setup diagram for your computer, and then restart the computer.
- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any keyboard extension cables and connect the keyboard directly to the computer.

TEST THE KEYBOARD — Connect a properly working keyboard to the computer, then try using the keyboard.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358.

Lockups and Software Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

The computer does not start up

CHECK THE DIAGNOSTIC LIGHTS — See "Diagnostic Lights" on page 347.

ENSURE THAT THE POWER CABLE IS FIRMLY CONNECTED TO THE COMPUTER AND TO THE ELECTRICAL OUTLET

The computer stops responding

NOTICE: You may lose data if you are unable to perform an operating system shutdown.

TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

A program stops responding

END THE PROGRAM —

1 Press <Ctrl><Shift><Esc> simultaneously to access the Task Manager.

2 Click the **Applications** tab.

3 Click to select the program that is no longer responding.

4 Click **End Task**.

A program crashes repeatedly

NOTE: Most software includes installation instructions in its documentation or on a floppy disk, CD, or DVD.

CHECK THE SOFTWARE DOCUMENTATION — If necessary, uninstall and then reinstall the program.

A program is designed for an earlier Windows operating system

RUN THE PROGRAM COMPATIBILITY WIZARD —

Windows XP:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-XP operating system environments.

1 Click **Start→ All Programs→ Accessories→ Program Compatibility Wizard→ Next**.

2 Follow the instructions on the screen.

Windows Vista:

The Program Compatibility Wizard configures a program so that it runs in an environment similar to non-Windows Vista operating system environments.

1 Click **Start** → **Control Panel→ Programs→ Use an older program with this version of Windows.**

2 In the welcome screen, click **Next**.

3 Follow the instructions on the screen.

A solid blue screen appears

TURN THE COMPUTER OFF — If you are unable to get a response by pressing a key on your keyboard or moving your mouse, press and hold the power button for at least 8 to 10 seconds (until the computer turns off), and then restart your computer.

Other software problems

CHECK THE SOFTWARE DOCUMENTATION OR CONTACT THE SOFTWARE MANUFACTURER FOR TROUBLESHOOTING INFORMATION —

- Ensure that the program is compatible with the operating system installed on your computer.
- Ensure that your computer meets the minimum hardware requirements needed to run the software. See the software documentation for information.
- Ensure that the program is installed and configured properly.
- Verify that the device drivers do not conflict with the program.
- If necessary, uninstall and then reinstall the program.

BACK UP YOUR FILES IMMEDIATELY

USE A VIRUS-SCANNING PROGRAM TO CHECK THE HARD DRIVE, FLOPPY DISKS, CDS, OR DVDS

SAVE AND CLOSE ANY OPEN FILES OR PROGRAMS AND SHUT DOWN YOUR COMPUTER THROUGH THE START MENU

Memory Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

IF YOU RECEIVE AN INSUFFICIENT MEMORY MESSAGE —

- Save and close any open files and exit any open programs you are not using to see if that resolves the problem.
- See the software documentation for minimum memory requirements. If necessary, install additional memory (see "Installing Memory" on page 314).
- Reseat the memory modules (see "Memory" on page 313) to ensure that your computer is successfully communicating with the memory.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 353).

IF YOU EXPERIENCE OTHER MEMORY PROBLEMS —

- Reseat the memory modules (see "Memory" on page 313) to ensure that your computer is successfully communicating with the memory.
- Ensure that you are following the memory installation guidelines (see "Installing Memory" on page 314).
- Ensure that the memory you are using is supported by your computer. For more information about the type of memory supported by your computer, see the specifications for your computer.
- Run the Dell Diagnostics (see "Dell Diagnostics" on page 353).

Mouse Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CHECK THE MOUSE CABLE —

- Ensure that the cable is not damaged or frayed and check cable connectors for bent or broken pins. Straighten any bent pins.
- Remove any mouse extension cables, and connect the mouse directly to the computer.
- Verify that the mouse cable is connected as shown on the setup diagram for your computer.

RESTART THE COMPUTER —

1. Simultaneously press <Ctrl><Esc> to display the **Start** menu.
2. Press <u>, press the up- and down-arrow keys to highlight **Shut down** or **Turn Off**, and then press <Enter>.
3. After the computer turns off, reconnect the mouse cable as shown on the setup diagram.
4. Turn on the computer.

TEST THE MOUSE — Connect a properly working mouse to the computer, then try using the mouse.

CHECK THE MOUSE SETTINGS —

Windows XP

1 Click **Start**→ **Control Panel**→ **Mouse**.

2 Adjust the settings as needed.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Mouse**.

2 Adjust the settings as needed.

REINSTALL THE MOUSE DRIVER — See "Drivers" on page 356.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358.

Network Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

CHECK THE NETWORK CABLE CONNECTOR — Ensure that the network cable is firmly inserted into the network connector on the back of the computer and the network jack.

CHECK THE NETWORK LIGHTS ON THE BACK OF THE COMPUTER — If the link integrity light is off (see "System Lights" on page 345), no network communication is occurring. Replace the network cable.

RESTART THE COMPUTER AND LOG ON TO THE NETWORK AGAIN

CHECK YOUR NETWORK SETTINGS — Contact your network administrator or the person who set up your network to verify that your network settings are correct and that the network is functioning.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358.

Power Problems

Troubleshooting Power Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

IF THE POWER LIGHT IS GREEN AND THE COMPUTER IS NOT RESPONDING — See "Diagnostic Lights" on page 347.

IF THE POWER LIGHT IS BLINKING GREEN — The computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

IF THE POWER LIGHT IS OFF — The computer is either turned off or is not receiving power.

- Reseat the power cable in the power connector on the back of the computer and the electrical outlet.
- Bypass power strips, power extension cables, and other power protection devices to verify that the computer turns on properly.
- Ensure that any power strips being used are plugged into an electrical outlet and are turned on.
- Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

- Ensure that the main power cable and front panel cable are securely connected to the system board (see the "System Board Components" section for your computer).
- Perform the power supply self-test, if applicable (see "Power Supply Self-Test" on page 340).

IF THE POWER LIGHT IS BLINKING AMBER — The computer is receiving electrical power, but an internal power problem may exist.

- Ensure that the voltage selection switch is set to match the AC power at your location (if applicable).
- Ensure that all components and cables are properly installed and securely connected to the system board (see the "System Board Components" section for your computer).
- Perform the power supply self-test, if applicable (see "Power Supply Self-Test" on page 340).

IF THE POWER LIGHT IS STEADY AMBER — A device may be malfunctioning or incorrectly installed.

- Ensure that the processor power cable is securely connected to the system board power connector (POWER2) (see the "System Board Components" section for your computer).
- Remove and then reinstall all memory modules (see "Memory" on page 313).
- Remove and then reinstall any expansion cards, including graphics cards (see the "Cards" section for your computer).
- Perform the power supply self-test, if applicable (see "Power Supply Self-Test" on page 340).

ELIMINATE INTERFERENCE — Some possible causes of interference are:

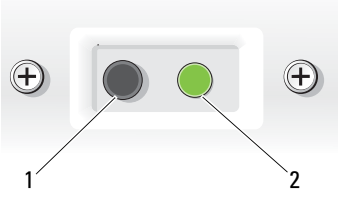
- Power, keyboard, and mouse extension cables
- Too many devices connected to the same power strip
- Multiple power strips connected to the same electrical outlet

Power Supply Self-Test

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

If your mini tower, desktop, or small form factor computer has been certified for ENERGY STAR® 4.0, then your power supply is equipped with a self-test feature to help with troubleshooting power problems. The self-test feature can be performed with the power supply connected to computer devices or in isolation. The test button and LED are accessible externally on the back of the power supply (where the AC plug is located).

NOTE: The power supply self-test feature is available only with ENERGY STAR 4.0 power supplies.



1 test button

2 test LED

To perform the power supply self-test:

1. Turn your computer off and disconnect the computer from the electrical outlet.
2. Disconnect the DC power supply connectors from the system board and all internal devices. The procedure for disconnecting the power supply cables depends on the form factor of your computer:
   - For the mini tower, see "Power Supply" on page 79
   - For the desktop, see "Power Supply" on page 155
   - For the small form factor, see "Power Supply" on page 219
3. Connect your computer to a working electrical outlet.
4. Press and hold the power supply test button.
   – If the test LED illuminates, the power supply is functioning properly. Connect the DC power supply connector to the system board, and then perform the test again. Continue to connect devices (one at a time) and perform the self-test until the test LED fails to illuminate and a faulty device is identified. Replace the defective device/part or contact Dell (see "Contacting Dell" on page 370).
   – If the test LED does not illuminate, the power supply is defective. Replace the power supply or contact Dell (see "Contacting Dell" on page 370).

Printer Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTE: If you need technical assistance for your printer, contact the printer's manufacturer.

CHECK THE PRINTER DOCUMENTATION — See the printer documentation for setup and troubleshooting information.

ENSURE THAT THE PRINTER IS TURNED ON

CHECK THE PRINTER CABLE CONNECTIONS —

- See the printer documentation for cable connection information.
- Ensure that the printer cables are securely connected to the printer and the computer.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

VERIFY THAT THE PRINTER IS RECOGNIZED BY WINDOWS —

Windows XP:

1. Click **Start→ Control Panel→ Printers and Other Hardware→ View installed printers or fax printers**.
2. If the printer is listed, right-click the printer icon.
3. Click **Properties→ Ports**. For a parallel printer, ensure that the **Print to the following port(s):** setting is **LPT1 (Printer Port)**. For a USB printer, ensure that the **Print to the following port(s):** setting is **USB**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Printer**.

2 If the printer is listed, right-click the printer icon.

3 Click **Properties** and click **Ports**.

4 Adjust the settings, as needed.

REINSTALL THE PRINTER DRIVER — SEE THE PRINTER DOCUMENTATION FOR INFORMATION ON REINSTALLING THE PRINTER DRIVER. —

Scanner Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTE: If you need technical assistance for your scanner, contact the scanner's manufacturer.

CHECK THE SCANNER DOCUMENTATION — See the scanner documentation for setup and troubleshooting information.

UNLOCK THE SCANNER — Ensure that your scanner is unlocked (if the scanner has a locking tab or button).

RESTART THE COMPUTER AND TRY THE SCANNER AGAIN

CHECK THE CABLE CONNECTIONS —

- See the scanner documentation for information on cable connections.
- Ensure that the scanner cables are securely connected to the scanner and the computer.

VERIFY THAT THE SCANNER IS RECOGNIZED BY MICROSOFT WINDOWS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Printers and Other Hardware**→ **Scanners and Cameras**.

2 If your scanner is listed, Windows recognizes the scanner.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Scanners and Cameras**.

2 If the scanner is listed, Windows recognizes the scanner.

REINSTALL THE SCANNER DRIVER — See the scanner documentation for instructions.

Sound and Speaker Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

No sound from speakers

NOTE: The volume control in MP3 and other media players may override the Windows volume setting. Always check to ensure that the volume on the media player(s) has not been turned down or off.

CHECK THE SPEAKER CABLE CONNECTIONS — Ensure that the speakers are connected as shown on the setup diagram supplied with the speakers. If you purchased a sound card, ensure that the speakers are connected to the card.

ENSURE THAT THE SUBWOOFER AND THE SPEAKERS ARE TURNED ON — See the setup diagram supplied with the speakers. If your speakers have volume controls, adjust the volume, bass, or treble to eliminate distortion.

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

DISCONNECT HEADPHONES FROM THE HEADPHONE CONNECTOR — Sound from the speakers is automatically disabled when headphones are connected to the computer's front-panel headphone connector.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

ELIMINATE POSSIBLE INTERFERENCE — Turn off nearby fans, fluorescent lights, or halogen lamps to check for interference.

RUN THE SPEAKER DIAGNOSTICS

REINSTALL THE SOUND DRIVER — See "Drivers" on page 356.

RUN THE HARDWARE TROUBLESHOOTER — See "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358.

No sound from headphones

CHECK THE HEADPHONE CABLE CONNECTION — Ensure that the headphone cable is securely inserted into the headphone connector (see the front and back views for the appropriate computer).

ADJUST THE WINDOWS VOLUME CONTROL — Click or double-click the speaker icon in the lower-right corner of your screen. Ensure that the volume is turned up and that the sound is not muted.

Video and Monitor Problems

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

NOTICE: If your computer came with a PCI graphics card installed, removal of the card is not necessary when installing additional graphics cards; however, the card is required for troubleshooting purposes. If you remove the card, store it in a safe and secure location. For information about your graphics card, go to **support.dell.com.**

The screen is blank

NOTE: For troubleshooting procedures, see the monitor's documentation.

The screen is difficult to read

CHECK THE MONITOR CABLE CONNECTION —

- Ensure that the monitor cable is connected to the correct graphics card (for dual graphics card configurations).
- If you are using the optional DVI-to-VGA adapter, ensure that the adapter is correctly attached to the graphics card and monitor.
- Ensure that the monitor cable is connected as shown on the setup diagram for your computer.
- Remove any video extension cables and connect the monitor directly to the computer.
- Swap the computer and monitor power cables to determine if the monitor's power cable is defective.
- Check the connectors for bent or broken pins (it is normal for monitor cable connectors to have missing pins).

CHECK THE MONITOR POWER LIGHT —

- If the power light is lit or blinking, the monitor has power.
- If the power light is off, firmly press the button to ensure that the monitor is turned on.
- If the power light is blinking, press a key on the keyboard or move the mouse to resume normal operation.

TEST THE ELECTRICAL OUTLET — Ensure that the electrical outlet is working by testing it with another device, such as a lamp.

CHECK THE DIAGNOSTIC LIGHTS — See "Diagnostic Lights" on page 347.

CHECK THE MONITOR SETTINGS — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

MOVE THE SUBWOOFER AWAY FROM THE MONITOR — If your speaker system includes a subwoofer, ensure that the subwoofer is positioned at least 60 centimeters (2 feet) away from the monitor.

MOVE THE MONITOR AWAY FROM EXTERNAL POWER SOURCES — Fans, fluorescent lights, halogen lamps, and other electrical devices can cause the screen image to appear shaky. Turn off nearby devices to check for interference.

ROTATE THE MONITOR TO ELIMINATE SUNLIGHT GLARE AND POSSIBLE INTERFERENCE

ADJUST THE WINDOWS DISPLAY SETTINGS —

Windows XP:

1 Click **Start**→ **Control Panel**→ **Appearance and Themes**.
2 Click the area you want to change or click the **Display** icon.
3 Try different settings for **Color quality** and **Screen resolution**.

Windows Vista:

1 Click **Start** → **Control Panel**→ **Hardware and Sound**→ **Personalization**→ **Display Settings**.
2 Adjust **Resolution** and **Colors** settings, as needed.

3D image quality is poor

CHECK THE GRAPHICS CARD POWER CABLE CONNECTION — Ensure that the power cable for the graphics card(s) is correctly attached to the card.

CHECK THE MONITOR SETTINGS — See the monitor documentation for instructions on adjusting the contrast and brightness, demagnetizing (degaussing) the monitor, and running the monitor self-test.

Power Lights

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

The power button light located on the front of the computer illuminates and blinks or remains solid to indicate different states:

- If the power light is green and the computer is not responding, see "Diagnostic Lights" on page 347.
- If the power light is blinking green, the computer is in standby mode. Press a key on the keyboard, move the mouse, or press the power button to resume normal operation.

- If the power light is off, the computer is either turned off or is not receiving power.
  - Reseat the power cable into both the power connector on the back of the computer and the electrical outlet.
  - If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and that the power strip is turned on.
  - Bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.
  - Ensure that the electrical outlet is working by testing it with another device, such as a lamp.
  - Ensure that the main power cable and front panel cable are securely connected to the system board (see the "System Board Components" section for your computer).
- If the power light is blinking amber, the computer is receiving electrical power, but an internal power problem might exist.
  - Ensure that the voltage selection switch is set to match the AC power at your location, if applicable.
  - Ensure that the processor power cable is securely connected to the system board (see the "System Board Components" section for your computer).
- If the power light is steady amber, a device may be malfunctioning or incorrectly installed.
  - Remove and then reinstall the memory modules (see "Memory" on page 313).
  - Remove and then reinstall any cards (see the "Cards" section for your computer).
- Eliminate interference. Some possible causes of interference are:
  - Power, keyboard, and mouse extension cables
  - Too many devices on a power strip
  - Multiple power strips connected to the same electrical outlet

System Lights

Your power button light and hard drive light may indicate a computer problem.

Power Light	Problem Description	Suggested Resolution
Solid green	Power is on, and the computer is operating normally. On the desktop computer, a solid green light indicates a network connection.	No corrective action is required.
Blinking green	The computer is in a power-saving mode.	Press the power button, move the mouse, or press a key on the keyboard to wake the computer.

Power Light	Problem Description	Suggested Resolution
Blinks green several times and then turns off	A configuration error exists.	Check the diagnostic lights to see if the specific problem is identified (see "Diagnostic Lights" on page 347).
Solid yellow	The Dell Diagnostics is running a test, or a device on the system board may be faulty or incorrectly installed.	If the Dell Diagnostics is running, allow the testing to complete. If the computer does not boot, contact Dell for technical assistance (see "Contacting Dell" on page 370).
Blinking yellow	A power supply or system board failure has occurred.	See "Power Problems" on page 339.
Solid green and a beep code during POST	A problem was detected while the BIOS was executing.	See "Beep Codes" on page 350 for instructions on diagnosing the beep code. Also, check the diagnostic lights to see if the specific problem is identified (see "Diagnostic Lights" on page 347).
Solid green power light and no beep code and no video during POST	The monitor or the graphics card may be faulty or incorrectly installed.	Check the diagnostic lights to see if the specific problem is identified (see "Diagnostic Lights" on page 347). See "Video and Monitor Problems" on page 343.
Solid green power light and no beep code but the computer locks up during POST	An integrated system board device may be faulty.	Check the diagnostic lights to see if the specific problem is identified (see "Diagnostic Lights" on page 347). If the problem is not identified, contact Dell for technical assistance (see "Contacting Dell" on page 370).

Diagnostic Lights

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions in the *Product Information Guide*.

To help troubleshoot a problem, your computer has four lights labeled 1, 2, 3, and 4 on the front panel. When the computer starts normally, the lights flash before turning off. If the computer malfunctions, the sequence of the lights help to identify the problem.

NOTE: After the computer completes POST, all four lights turn off before booting to the operating system.

Light Pattern	Problem Description	Suggested Resolution
	The computer is in a normal *off* condition or a possible pre-BIOS failure has occurred. The diagnostic lights are not lit after the computer successfully boots to the operating system.	• Plug the computer into a working electrical outlet (see "Power Problems" on page 339). • If the problem persists, contact Dell (see "Contacting Dell" on page 370).
	A possible processor failure has occurred.	• Reseat the processor (see Processor information for your computer). • If the problem persists, contact Dell (see "Contacting Dell" on page 370).
	Memory modules are detected, but a memory failure has occurred.	• If two or more memory modules are installed, remove the modules (see "Removing Memory" on page 316), then reinstall one module (see "Installing Memory" on page 314) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer (see "Installing Memory" on page 314). • If the problem persists, contact Dell (see "Contacting Dell" on page 370).
	A possible graphics card failure has occurred.	• Reseat any installed graphics cards (see the "Cards" section for your computer). • If available, install a working graphics card into your computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 370).

Light Pattern	Problem Description	Suggested Resolution
	A possible floppy drive or hard drive failure has occurred.	Reseat all power and data cables.
	A possible USB failure has occurred.	Reinstall all USB devices and check all cable connections.
	No memory modules are detected.	• If two or more memory modules are installed, remove the modules (see "Removing Memory" on page 316), then reinstall one module (see "Installing Memory" on page 314) and restart the computer. If the computer starts normally, continue to install additional memory modules (one at a time) until you have identified a faulty module or reinstalled all modules without error. • If available, install working memory of the same type into your computer (see "Installing Memory" on page 314). • If the problem persists, contact Dell (see "Contacting Dell" on page 370).
	Memory modules are detected, but a memory configuration or compatibility error has occurred.	• Ensure that no special requirements for memory module/connector placement exist (see "Memory" on page 313). • Ensure that the memory you are using is supported by your computer (see the "Specifications" section for your computer). • If the problem persists, contact Dell (see "Contacting Dell" on page 370).

Light Pattern	Problem Description	Suggested Resolution
	A possible expansion card failure has occurred.	**1** Determine if a conflict exists by removing an expansion card (not a graphics card) and restarting the computer (see the "Cards" section for your computer). **2** If the problem persists, reinstall the card you removed, then remove a different card and restart the computer. **3** Repeat this process for each expansion card installed. If the computer starts normally, troubleshoot the last card removed from the computer for resource conflicts (see "Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems" on page 358). **4** If the problem persists, contact Dell (see "Contacting Dell" on page 370).
	Another failure has occurred.	• Ensure that all hard drive and optical drive cables are properly connected to the system board (see the "System Board Components" section for your computer). • If there is an error message on the screen identifying a problem with a device (such as the floppy drive or hard drive), check the device to make sure it is functioning properly. • If the operating system is attempting to boot from a device (such as the floppy drive or optical drive), check system setup (see "System Setup" on page 280) to ensure the boot sequence is correct for the devices installed on your computer. • If the problem persists, contact Dell (see "Contacting Dell" on page 370).

Beep Codes

Your computer might emit a series of beeps during start-up if the monitor cannot display errors or problems. This series of beeps, called a beep code, identifies a problem. For example, beep code 1-3-1 (one possible beep code) consists of one beep, a burst of three beeps, and then one beep. This beep code tells you that the computer encountered a memory problem.

Reseating the memory modules may correct the following beep code errors. If the problem persists, contact Dell (see "Contacting Dell" on page 370) for instructions on obtaining technical assistance.

Code	Cause
1-3-1 through 2-4-4	Memory not being properly identified or used
4-3-1	Memory failure above address 0FFFFh

If you experience any of the following beep code errors, see "Contacting Dell" on page 370 for instructions on obtaining technical assistance.

Code	Cause
1-1-2	Microprocessor register failure
1-1-3	NVRAM read/write failure
1-1-4	ROM BIOS checksum failure
1-2-1	Programmable interval timer failure
1-2-2	DMA initialization failure
1-2-3	DMA page register read/write failure
1-3	Video Memory Test failure
1-3-1 through 2-4-4	Memory not being properly identified or used
3-1-1	Slave DMA register failure
3-1-2	Master DMA register failure
3-1-3	Master interrupt mask register failure
3-1-4	Slave interrupt mask register failure
3-2-2	Interrupt vector loading failure
3-2-4	Keyboard Controller Test failure
3-3-1	NVRAM power loss
3-3-2	Invalid NVRAM configuration
3-3-4	Video Memory Test failure
3-4-1	Screen initialization failure

Code	Cause
3-4-2	Screen retrace failure
3-4-3	Search for video ROM failure
4-2-1	No timer tick
4-2-2	Shutdown failure
4-2-3	Gate A20 failure
4-2-4	Unexpected interrupt in protected mode
4-3-1	Memory failure above address 0FFFFh
4-3-3	Timer-chip counter 2 failure
4-3-4	Time-of-day clock stopped
4-4-1	Serial or parallel port test failure
4-4-2	Failure to decompress code to shadowed memory
4-4-3	Math-coprocessor test failure
4-4-4	Cache test failure

System Messages

NOTE: If the message you received is not listed in the table, see the documentation for either the operating system or the program that was running when the message appeared.

Message	Possible Cause	Corrective Action
`8042 Gate-A20 error`	The keyboard controller failed its test.	If you receive this message after you make changes in the system setup program, enter the system setup program and restore the original value(s).
`Address Line Short!`	An error in the address decoding circuitry in the memory has occurred.	Reseat the memory modules (see "Memory" on page 313).
`C: Drive Error` `C: Drive Failure`	The hard drive is not working or is not configured correctly.	Ensure that the hard drive is installed correctly in the computer (see the "Drives" section for your computer) and defined correctly in the system setup program (see "System Setup" on page 280).
`Cache Memory Bad, Do Not Enable Cache`	The cache memory is not operating.	See "Contacting Dell" on page 370 for instructions on obtaining technical assistance.

Message	Possible Cause	Corrective Action
CH-2 Timer Error	An error is occurring on the timer on the system board.	See "Contacting Dell" on page 370 for instructions on obtaining technical assistance.
CMOS Battery State Low CMOS Checksum Failure CMOS System Options Not Set CMOS Display Type Mismatch CMOS Memory Size Mismatch CMOS Time and Date Not Set	The system configuration information in the system setup program is incorrect or the battery charge may be low.	Enter the system setup program (see "System Setup" on page 280), verify the system configuration, and then restart the computer.
Diskette Boot Failure	Drive A or B is present but has failed the BIOS POST.	Ensure that the drive is installed correctly in the computer (see the "Drives" section for your computer) and defined correctly in the system setup program (see "System Setup" on page 280). Check the interface cable at both ends.
DMA Error DMA 1 Error DMA 2 Error	Error in the DMA controller on the system board.	The keyboard or system board may need to be replaced.
FDD Controller Failure HDD Controller Failure	The BIOS cannot communicate with the floppy drive or hard drive controller.	Ensure that the floppy drive or the hard drive is installed correctly in the computer (see "Drives" section for your computer) and defined correctly in the system setup program (see "System Setup" on page 280). Check the interface cable at both ends.
INTR1 Error INTR2 Error	An interrupt channel on the system board failed to POST.	The keyboard or system board may need to be replaced.
Invalid Boot Diskette	The operating system cannot be located on drive A or drive C.	Enter the system setup program (see "System Setup" on page 280) and confirm that drive A or drive C is properly identified.

Message	Possible Cause	Corrective Action
Keyboard Error	The BIOS has detected a stuck key.	Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.
KB/Interface Error	An error occurred with the keyboard connector.	Ensure that nothing is resting on the keyboard; if a key appears to be stuck, carefully pry it up. If the problem persists, you may need to replace the keyboard.
No ROM Basic	The operating system cannot be located on drive A or drive C.	Enter the system setup program (see "System Setup" on page 280) and confirm that drive A or drive C is properly identified.

Dell Diagnostics

CAUTION: Before you begin any of the procedures in this section, follow the safety instructions located in the *Product Information Guide*.

When to Use the Dell Diagnostics

If you experience a problem with your computer, perform the checks in this section and run the Dell Diagnostics before you contact Dell for technical assistance.

It is recommended that you print these procedures before you begin.

NOTICE: The Dell Diagnostics works only on Dell™ computers.

Enter system setup (see "Entering System Setup" on page 280), review your computer's configuration information, and ensure that the device you want to test displays in system setup and is active.

Start the Dell Diagnostics from either your hard drive or from the *Drivers and Utilities media* (an optional CD). See "Starting the Dell Diagnostics From Your Hard Drive" on page 353 or "Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional)" on page 354 for more information.

Starting the Dell Diagnostics From Your Hard Drive

NOTE: If your computer does not display a screen image, contact Dell (see "Contacting Dell" on page 370).

1. Ensure that the computer is connected to an electrical outlet that is known to be working properly.
2. Turn on (or restart) your computer.
3. When the DELL logo appears, press <F12> immediately.

   NOTE: Keyboard failure may result when a key is held down for extended periods of time. To avoid possible keyboard failure, press and release <F12> in even intervals to open the Boot Device Menu.

   If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft Windows desktop, and then shut down your computer and try again.

4 Use the up- and down-arrow keys to select **Diagnostics** from the boot menu and then press <Enter>.

The computer runs the Pre-boot System Assessment (PSA), a series of initial tests of your system board, keyboard, display, memory, hard drive, and so on.

- Answer any questions that appear.
- If failures are detected, write down the error code(s) and see "Contacting Dell" on page 370.
- If the Pre-boot System Assessment completes successfully, the following message appears: "`Booting Dell Diagnostic Utility Partition. Press any key to continue.`"

NOTE: If you see a message stating that no diagnostics utility partition has been found, run the Dell Diagnostics from your *Drivers and Utilities* media (see "Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional)" on page 354).

5 Press any key to start the Dell Diagnostics from the diagnostics utility partition on your hard drive.

6 Press <Tab> to select **Test System** and then press <Enter>.

NOTE: It is recommended that you select **Test System** to run a complete test on your computer. Selecting **Test Memory** initiates the extended memory test, which can take up to thirty minutes or more to complete. When the test completes, record the test results and then press any key to return to the previous menu.

7 At the Dell Diagnostics Main Menu, left-click with the mouse, or press <Tab> and then <Enter>, to select the test you want to run (see "Dell Diagnostics Main Menu" on page 355).

NOTE: Write down any error codes and problem descriptions exactly as they appear and follow the instructions on the screen.

8 After all tests have completed, close the test window to return to the Dell Diagnostics Main Menu.

9 Close the Main Menu window to exit the Dell Diagnostics and restart the computer.

Starting the Dell Diagnostics From the Drivers and Utilities CD (Optional)

1 Insert the *Drivers and Utilities* CD (optional).

2 Shut down and restart the computer.

When the DELL logo appears, press <F12> immediately.

If you wait too long and the Windows logo appears, continue to wait until you see the Windows desktop. Then shut down your computer and try again.

NOTE: The next steps change the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in system setup.

3 When the boot device list appears, highlight **SATA CD-ROM Device** and press <Enter>.

4 Select the **SATA CD-ROM Device** option from the CD boot menu.

5 Select the **Boot from CD-ROM** option from the menu that appears.

6 Type `1` to start the *Drivers and Utilities* CD menu.

7 Type `2` to start the Dell Diagnostics.

8 Select **Run the 32 Bit Dell Diagnostics** from the numbered list. If multiple versions are listed, select the version appropriate for your computer.

9 When the Dell Diagnostics **Main Menu** appears, select the test you want to run (see "Dell Diagnostics Main Menu" on page 355).

Dell Diagnostics Main Menu

1 After the Dell Diagnostics loads and the **Main Menu** screen appears, click the button for the option you want.

Option	Function
Express Test	Performs a quick test of devices. This test typically takes 10 to 20 minutes and requires no interaction on your part. Run **Express Test** first to increase the possibility of tracing the problem quickly.
Extended Test	Performs a thorough check of devices. This test typically takes an hour or more and requires you to answer questions periodically.
Custom Test	Tests a specific device. You can customize the tests you want to run.
Symptom Tree	Lists the most common symptoms encountered and allows you to select a test based on the symptom of the problem you are having.

2 If a problem is encountered during a test, a message appears with an error code and a description of the problem. Write down the error code and problem description and follow the instructions on the screen.

If you cannot resolve the error condition, contact Dell (see "Contacting Dell" on page 370).

NOTE: The Service Tag for your computer is located at the top of each test screen. If you contact Dell, technical support will ask for your Service Tag. Your computer's Service Tag is listed in the **System Info** option in system setup. See "System Setup" on page 280 for more information.

3 If you run a test from the **Custom Test** or **Symptom Tree** option, click the applicable tab described in the following table for more information.

Tab	Function
Results	Displays the results of the test and any error conditions encountered.
Errors	Displays error conditions encountered, error codes, and the problem description.
Help	Describes the test and may indicate requirements for running the test.

Tab	Function
Configuration	Displays your hardware configuration for the selected device. The Dell Diagnostics obtains configuration information for all devices from system setup, memory, and various internal tests, and it displays the information in the device list in the left pane of the screen. The device list may not display the names of all the components installed on your computer or all devices attached to your computer.
Parameters	Allows you to customize the test by changing the test settings.

4 When the tests are completed, if you are running the Dell Diagnostics from the *Drivers and Utilities CD*, remove the CD.

5 Close the test screen to return to the **Main Menu** screen. To exit the Dell Diagnostics and restart the computer, close the **Main Menu** screen.

Drivers

What Is a Driver?

A driver is a program that controls a device such as a printer, mouse, or keyboard. All devices require a driver program.

A driver acts like a translator between the device and any other programs that use the device. Each device has its own set of specialized commands that only its driver recognizes.

Dell ships your computer to you with required drivers already installed—no further installation or configuration is needed.

NOTICE: The *Drivers and Utilities* media may contain drivers for operating systems that are not on your computer. Ensure that you are installing software appropriate for your operating system.

Many drivers, such as the keyboard driver, come with your Microsoft Windows operating system. You may need to install drivers if you:

- Upgrade your operating system.
- Reinstall your operating system.
- Connect or install a new device.

Identifying Drivers

If you experience a problem with any device, identify whether the driver is the source of your problem and, if necessary, update the driver.

Microsoft® Windows® XP

1. Click **Start**→ **Control Panel**.
2. Under **Pick a Category**, click **Performance and Maintenance**, and click **System**.
3. In the **System Properties** window, click the **Hardware** tab, and click **Device Manager**.

Microsoft Windows Vista®

1. Click the Windows Vista start button , and right-click **Computer**.
2. Click **Properties**→ **Device Manager**.

   NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue.

Scroll down the list to see if any device has an exclamation point (a yellow circle with a [!]) on the device icon.

If an exclamation point is next to the device name, you may need to reinstall the driver or install a new driver (see "Reinstalling Drivers and Utilities" on page 357).

Reinstalling Drivers and Utilities

NOTICE: The Dell Support website at **support.dell.com** and your *Drivers and Utilities* media provide approved drivers for Dell™ computers. If you install drivers obtained from other sources, your computer might not work correctly.

Using Windows Device Driver Rollback

If a problem occurs on your computer after you install or update a driver, use Windows Device Driver Rollback to replace the driver with the previously installed version.

Windows XP:

1. Click **Start**→ **My Computer**→ **Properties**→ **Hardware**→ **Device Manager**.
2. Right-click the device for which the new driver was installed and click **Properties**.
3. Click the **Drivers** tab→ **Roll Back Driver**.

Windows Vista:

1. Click the Windows Vista start button , and right-click **Computer**.
2. Click **Properties**→ **Device Manager**.

   NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.
3. Right-click the device for which the new driver was installed and click **Properties**.
4. Click the **Drivers** tab→ **Roll Back Driver**.

If Device Driver Rollback does not resolve the problem, then use System Restore (see "Restoring Your Operating System" on page 359) to return your computer to the operating state that existed before you installed the new driver.

Manually Reinstalling Drivers

After extracting the driver files to your hard drive as described in the previous section:

Windows XP:

1. Click **Start**→ **My Computer**→ **Properties**→ **Hardware**→ **Device Manager**.
2. Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).
3. Double-click the name of the device for which you are installing the driver.
4. Click the **Driver** tab→ **Update Driver**.
5. Click **Install from a list or specific location (Advanced)**→ **Next**.
6. Click **Browse** and browse to the location to which you previously copied the driver files.
7. When the name of the appropriate driver appears, click **Next**.
8. Click **Finish** and restart your computer.

Windows Vista:

1. Click the Windows Vista start button , and right-click **Computer**.
2. Click **Properties**→ **Device Manager**.

   NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to enter the Device Manager.
3. Double-click the type of device for which you are installing the driver (for example, **Audio** or **Video**).
4. Double-click the name of the device for which you are installing the driver.
5. Click the **Driver** tab→ **Update Driver**→ **Browse my computer for driver software**.
6. Click **Browse** and browse to the location to which you previously copied the driver files.
7. When the name of the appropriate driver appears, click the name of the driver→ **OK**→ **Next**.
8. Click **Finish** and restart your computer.

Troubleshooting Software and Hardware Problems in the Microsoft® Windows® XP and Microsoft Windows Vista® Operating Systems

If a device is either not detected during the operating system setup or is detected but incorrectly configured, you can use the Hardware Troubleshooter to resolve the incompatibility.

To start the Hardware Troubleshooter:

Windows XP:

1. Click **Start→ Help and Support**.
2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
3. In the **Fix a Problem** section, click **Hardware Troubleshooter**.
4. In the **Hardware Troubleshooter** list, select the option that best describes the problem and click **Next** to follow the remaining troubleshooting steps.

Windows Vista:

1. Click the Windows Vista start button , and click **Help and Support.**
2. Type `hardware troubleshooter` in the search field and press <Enter> to start the search.
3. In the search results, select the option that best describes the problem and follow the remaining troubleshooting steps.

Restoring Your Operating System

You can restore your operating system in the following ways:

- System Restore returns your computer to an earlier operating state without affecting data files. Use System Restore as the first solution for restoring your operating system and preserving data files.
- Dell PC Restore by Symantec (available in Windows XP) and Dell Factory Image Restore (available in Windows Vista) returns your hard drive to the operating state it was in when you purchased the computer. Both permanently delete all data on the hard drive and remove any programs installed after you received the computer. Use Dell PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.
- If you received an *Operating System* disc with your computer, you can use it to restore your operating system. However, using the *Operating System* disc also deletes all data on the hard drive. Use the disc *only* if System Restore did not resolve your operating system problem.

Using Microsoft Windows System Restore

The Windows operating systems provide a System Restore option which allows you to return your computer to an earlier operating state (without affecting data files) if changes to the hardware, software, or other system settings have left the computer in an undesirable operating state. Any changes that System Restore makes to your computer are completely reversible.

NOTICE: Make regular backups of your data files. System Restore does not monitor your data files or recover them.

NOTE: The procedures in this document were written for the Windows default view, so they may not apply if you set your Dell™ computer to the Windows Classic view.

Starting System Restore

Windows XP:

NOTICE: Before you restore the computer to an earlier operating state, save and close any open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.

1. Click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **System Restore**.
2. Click either **Restore my computer to an earlier time** or **Create a restore point**.
3. Click **Next** and follow the remaining on-screen prompts.

Windows Vista:

1. Click **Start** .
2. In the Start Search box, type `System Restore` and press <Enter>.

   NOTE: The **User Account Control** window may appear. If you are an administrator on the computer, click **Continue**; otherwise, contact your administrator to continue the desired action.
3. Click **Next** and follow the remaining prompts on the screen.

In the event that System Restore did not resolve the issue, you may undo the last system restore.

Undoing the Last System Restore

NOTICE: Before you undo the last system restore, save and close all open files and exit any open programs. Do not alter, open, or delete any files or programs until the system restoration is complete.

Windows XP:

1. Click **Start**→ **All Programs**→ **Accessories**→ **System Tools**→ **System Restore**.
2. Click **Undo my last restoration** and click **Next**.

Windows Vista:

1. Click **Start** .
2. In the Start Search box, type `System Restore` and press <Enter>.
3. Click **Undo my last restoration** and click **Next**.

Enabling System Restore

NOTE: Windows Vista does not disable System Restore; regardless of low disk space. Therefore, the steps below apply only to Windows XP.

If you reinstall Windows XP with less than 200 MB of free hard-disk space available, System Restore is automatically disabled.

To see if System Restore is enabled:

1. Click **Start**→ **Control Panel**→ **Performance and Maintenance**→ **System**.
2. Click the **System Restore** tab and ensure that **Turn off System Restore** is unchecked.

Using Dell™ PC Restore and Dell Factory Image Restore

NOTICE: Using Dell PC Restore or Dell Factory Image Restore permanently deletes all data on the hard drive and removes any programs or drivers installed after you received your computer. If possible, back up the data before using these options. Use PC Restore or Dell Factory Image Restore only if System Restore did not resolve your operating system problem.

NOTE: Dell PC Restore by Symantec and Dell Factory Image Restore may not be available in certain countries or on certain computers.

Use Dell PC Restore (Windows XP) or Dell Factory Image Restore (Windows Vista) only as the last method to restore your operating system. These options restore your hard drive to the operating state it was in when you purchased the computer. Any programs or files added since you received your computer—including data files—are permanently deleted from the hard drive. Data files include documents, spreadsheets, e-mail messages, digital photos, music files, and so on. If possible, back up all data before using PC Restore or Factory Image Restore.

Windows XP: Dell PC Restore

Using PC Restore:

1. Turn on the computer.

   During the boot process, a blue bar with **www.dell.com** appears at the top of the screen.

2. Immediately upon seeing the blue bar, press <Ctrl><F11>.

   If you do not press <Ctrl><F11> in time, let the computer finish starting, and then restart the computer again.

NOTICE: If you do not want to proceed with PC Restore, click **Reboot**.

3. Click **Restore** and click **Confirm**.

   The restore process takes approximately 6 to 10 minutes to complete.

4. When prompted, click **Finish** to reboot the computer.

NOTE: Do not manually shut down the computer. Click **Finish** and let the computer completely reboot.

5. When prompted, click **Yes**.

   The computer restarts. Because the computer is restored to its original operating state, the screens that appear, such as the End User License Agreement, are the same ones that appeared the first time the computer was turned on.

6. Click **Next**.

   The **System Restore** screen appears and the computer restarts.

7. After the computer restarts, click **OK**.

Removing PC Restore:

NOTICE: Removing Dell PC Restore from the hard drive permanently deletes the PC Restore utility from your computer. After you have removed Dell PC Restore, you will not be able to use it to restore your computer operating system.

Dell PC Restore enables you to restore your hard drive to the operating state it was in when you purchased your computer. It is recommended that you *do not* remove PC Restore from your computer, even to gain additional hard drive space. If you remove PC Restore from the hard drive, you cannot ever recall it, and you will never be able to use PC Restore to return your computer operating system to its original state.

1. Log on to the computer as a local administrator.
2. In Microsoft Windows Explorer, go to **c:\dell\utilities\DSR**.
3. Double-click the filename **DSRIRRemv2.exe**.

   NOTE: If you do not log on as a local administrator, a message appears stating that you that you must log on as administrator. Click **Quit**, and then log on as a local administrator.

   NOTE: If the partition for PC Restore does not exist on your computer hard drive, a message appears stating that the partition was not found. Click **Quit**; there is no partition to delete.
4. Click **OK** to remove the PC Restore partition on the hard drive.
5. Click **Yes** when a confirmation message appears.

   The PC Restore partition is deleted and the newly available disk space is added to the free space allocation on the hard drive.
6. Right-click **Local Disk (C)** in Windows Explorer, click **Properties**, and verify that the additional disk space is available as indicated by the increased value for **Free Space**.
7. Click **Finish** to close the **PC Restore Removal** window and restart the computer.

Windows Vista: Dell Factory Image Restore

1. Turn on the computer. When the Dell logo appears, press <F8> several times to access the **Vista Advanced Boot Options** window.
2. Select **Repair Your Computer**.

   The **System Recovery Options** window appears.
3. Select a keyboard layout and click **Next**.
4. To access the recovery options, log on as a local user. To access the command prompt, type `administrator` in the **User name** field, then click **OK**.
5. Click **Dell Factory Image Restore**.

   NOTE: Depending upon your configuration, you may need to select **Dell Factory Tools**, then **Dell Factory Image Restore**.

   The **Dell Factory Image Restore** welcome screen appears.
6. Click **Next.**

The **Confirm Data Deletion** screen appears.

NOTICE: If you do not want to proceed with Factory Image Restore, click **Cancel**.

7 Click the checkbox to confirm that you want to continue reformatting the hard drive and restoring the system software to the factory condition, then click **Next**.

The restore process begins and may take five or more minutes to complete. A message appears when the operating system and factory-installed applications have been restored to factory condition.

8 Click **Finish** to reboot the computer.

Using the Operating System Media

Before you Begin

If you are considering reinstalling the Windows operating system to correct a problem with a newly installed driver, first try using Windows Device Driver Rollback. See "Using Windows Device Driver Rollback" on page 357. If Device Driver Rollback does not resolve the problem, then use System Restore to return your operating system to the operating state it was in before you installed the new device driver. See "Using Microsoft Windows System Restore" on page 359.

NOTICE: Before performing the installation, back up all data files on your primary hard drive. For conventional hard drive configurations, the primary hard drive is the first drive detected by the computer.

To reinstall Windows , you need the following items:

- Dell™ *Operating System* media
- Dell *Drivers and Utilities* media

NOTE: The Dell *Drivers and Utilities* media contains drivers that were installed during the assembly of the computer. Use the Dell *Drivers and Utilities* media to load any required drivers. Depending on the region from which you ordered your computer, or whether you requested the media, the Dell *Drivers and Utilities* media and *Operating System* media may not ship with your computer.

Reinstalling Windows XP or Windows Vista

The reinstallation process can take 1 to 2 hours to complete. After you reinstall the operating system, you must also reinstall the device drivers, virus protection program, and other software.

NOTICE: The *Operating System* media provides options for reinstalling Windows XP. The options can overwrite files and possibly affect programs that are installed on your hard drive. Therefore, do not reinstall Windows XP unless a Dell technical support representative instructs you to do so.

1 Save and close any open files and exit any open programs.

2 Insert the *Operating System* disc.

3 Click **Exit** if the `Install Windows` message appears.

4 Restart the computer.

When the DELL logo appears, press <F12> immediately.

NOTE: If you wait too long and the operating system logo appears, continue to wait until you see the Microsoft® Windows® desktop; then, shut down your computer and try again.

NOTE: The next steps change the boot sequence for one time only. On the next start-up, the computer boots according to the devices specified in the system setup program.

5 When the boot device list appears, highlight **CD/DVD/CD-RW Drive** and press <Enter>.

6 Press any key to **Boot from CD-ROM**.

7 Follow the instructions on the screen to complete the installation.

Getting Help

Obtaining Assistance

CAUTION: If you need to remove the computer covers, first disconnect the computer power and modem cables from all electrical outlets.

1. Complete the procedures in "Troubleshooting" on page 331.
2. Run the Dell Diagnostics (see "Dell Diagnostics" on page 353).
3. Make a copy of the Diagnostics Checklist (see "Diagnostics Checklist" on page 369) and fill it out.
4. Use Dell's extensive suite of online services available at Dell Support (**support.dell.com**) for help with installation and troubleshooting procedures.
5. If the preceding steps have not resolved the problem, contact Dell.

NOTE: Call the support service from a telephone near or at the computer so that the support staff can assist you with any necessary procedures.

NOTE: Dell's Express Service Code system may not be available in all countries.

When prompted by Dell's automated telephone system, enter your Express Service Code to route the call directly to the proper support personnel. If you do not have an Express Service Code, open the **Dell Accessories** folder, double-click the **Express Service Code** icon, and follow the directions.

For instructions on using the support service, see "Support Service" on page 366.

NOTE: Some of the following services are not always available in all locations outside the continental U.S. Call your local Dell representative for information on availability.

Online Services

You can access Dell Support at **support.dell.com**. Select your region on the **WELCOME TO DELL SUPPORT** page, and fill in the requested details to access help tools and information.

You can contact Dell electronically using the following addresses:

- World Wide Web

  www.dell.com/

  www.dell.com/ap/ (Asian/Pacific countries only)

  www.dell.com/jp (Japan only)

  www.euro.dell.com (Europe only)

  www.dell.com/la/ (Latin American and Caribbean countries)

  www.dell.ca (Canada only)

- Anonymous file transfer protocol (FTP)

  ftp.dell.com/

  Log in as user: `anonymous`, and use your e-mail address as your password.

- Electronic Support Service

  mobile_support@us.dell.com

  support@us.dell.com

  la-techsupport@dell.com (Latin America and Caribbean countries only)

  apsupport@dell.com (Asian/Pacific countries only)

  support.jp.dell.com (Japan only)

  support.euro.dell.com (Europe only)

- Electronic Quote Service

  apmarketing@dell.com (Asian/Pacific countries only)

  sales_canada@dell.com (Canada only)

AutoTech Service

Dell's automated support service—AutoTech—provides recorded answers to the questions most frequently asked by Dell customers about their portable and desktop computers.

When you call AutoTech, use your touch-tone telephone to select the subjects that correspond to your questions.

The AutoTech service is available 24 hours a day, 7 days a week. You can also access this service through the support service. For the telephone number to call for your region, see "Contacting Dell" on page 370.

Automated Order-Status Service

To check on the status of any Dell™ products that you have ordered, you can go to **support.dell.com**, or you can call the automated order-status service. A recording prompts you for the information needed to locate and report on your order. For the telephone number to call for your region, see "Contacting Dell" on page 370.

Support Service

Dell's support service is available 24 hours a day, 7 days a week, to answer your questions about Dell hardware. Our support staff uses computer-based diagnostics to provide fast, accurate answers.

To contact Dell's support service, see "Getting Help" on page 365 and then call the number for your country as listed in "Contacting Dell" on page 370.

Problems With Your Order

If you have a problem with your order, such as missing parts, wrong parts, or incorrect billing, contact Dell for customer assistance. Have your invoice or packing slip handy when you call. For the telephone number to call for your region, see "Contacting Dell" on page 370.

Product Information

If you need information about additional products available from Dell, or if you would like to place an order, visit the Dell website at **www.dell.com**. For the telephone number to call for your region or to speak to a sales specialist, see "Contacting Dell" on page 370.

Returning Items for Warranty Repair or Credit

Prepare all items being returned, whether for repair or credit, as follows:

1. Call Dell to obtain a Return Material Authorization Number, and write it clearly and prominently on the outside of the box.

   For the telephone number to call for your region, see "Contacting Dell" on page 370.
2. Include a copy of the invoice and a letter describing the reason for the return.
3. Include a copy of the Diagnostics Checklist (see "Diagnostics Checklist" on page 369), indicating the tests that you have run and any error messages reported by the Dell Diagnostics (see "Dell Diagnostics" on page 353).
4. Include any accessories that belong with the item(s) being returned (power cables, software floppy disks, guides, and so on) if the return is for credit.
5. Pack the equipment to be returned in the original (or equivalent) packing materials.

You are responsible for paying shipping expenses. You are also responsible for insuring any product returned, and you assume the risk of loss during shipment to Dell. Collect On Delivery (C.O.D.) packages are not accepted.

Returns that are missing any of the preceding requirements will be refused at Dell's receiving dock and returned to you.

Before You Call

NOTE: Have your Express Service Code ready when you call. The code helps Dell's automated-support telephone system direct your call more efficiently. You may also be asked for your Service Tag (located on the back or bottom of your computer).

Remember to fill out the Diagnostics Checklist (see "Diagnostics Checklist" on page 369). If possible, turn on your computer before you call Dell for assistance and call from a telephone at or near the computer. You may be asked to type some commands at the keyboard, relay detailed information during operations, or try other troubleshooting steps possible only at the computer itself. Ensure that the computer documentation is available.

CAUTION: Before working inside your computer, follow the safety instructions in your *Product Information Guide*.

Diagnostics Checklist

Name:

Date:

Address:

Phone number:

Service Tag (bar code on the back or bottom of the computer):

Express Service Code:

Return Material Authorization Number (if provided by Dell support technician):

Operating system and version:

Devices:

Expansion cards:

Are you connected to a network? Yes No

Network, version, and network adapter:

Programs and versions:

See your operating system documentation to determine the contents of the system's start-up files. If the computer is connected to a printer, print each file. Otherwise, record the contents of each file before calling Dell.

Error message, beep code, or diagnostic code:

Description of problem and troubleshooting procedures you performed:

Contacting Dell

NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

For customers in the United States, call 800-WWW.DELL (800.999.3355).

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit **support.dell.com**.
2. Verify your country or region in the **Choose A Country/Region** drop-down menu at the bottom of the page.
3. Click **Contact Us** on the left side of the page.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.

Warranty

Dell Inc. (“Dell”) manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your computer, see the *Product Information Guide* or separate paper warranty document that shipped with your computer.

FCC Notices (U.S. Only)

FCC Class B

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTICE: The FCC regulations provide that changes or modifications not expressly approved by Dell Inc. could void your authority to operate this equipment.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference with radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the system with respect to the receiver.
- Move the system away from the receiver.
- Plug the system into a different outlet so that the system and the receiver are on different branch circuits.

If necessary, consult a representative of Dell Inc. or an experienced radio/television technician for additional suggestions.

The following information is provided on the device or devices covered in this document in compliance with the FCC regulations:

- Product name: Dell™ OptiPlex™ 755
- Model numbers: DCTR, DCNE, DCSM, DCCY
- Company name:
  Dell Inc.
  Worldwide Regulatory Compliance & Environmental Affairs
  One Dell Way
  Round Rock, TX 78682 USA
  512-338-4400

NOTE: For Further regulatory information, see your *Product Information Guide*.

Glossary

Terms in this Glossary are provided for informational purposes only and may or may not describe features included with your particular computer.

A

AC — alternating current — The form of electricity that powers your computer when you plug the AC adapter power cable in to an electrical outlet.

ACPI — advanced configuration and power interface — A power management specification that enables Microsoft® Windows® operating systems to put a computer in standby or hibernate mode to conserve the amount of electrical power allocated to each device attached to the computer.

AGP — accelerated graphics port — A dedicated graphics port that allows system memory to be used for video-related tasks. AGP delivers a smooth, true-color video image because of the faster interface between the video circuitry and the computer memory.

AHCI — Advanced Host Controller Interface — An interface for a SATA hard drive Host Controller which allows the storage driver to enable technologies such as Native Command Queuing (NCQ) and hot plug.

ALS — ambient light sensor — A feature that helps to control display brightness.

antivirus software — A program designed to identify, quarantine, and/or delete viruses from your computer.

ASF — alert standards format — A standard to define a mechanism for reporting hardware and software alerts to a management console. ASF is designed to be platform- and operating system-independent.

B

battery life span — The length of time (years) during which a portable computer battery is able to be depleted and recharged.

battery operating time — The length of time (minutes or hours) that a portable computer battery powers the computer.

BIOS — basic input/output system — A program (or utility) that serves as an interface between the computer hardware and the operating system. Unless you understand what effect these settings have on the computer, do not change them. Also referred to as *system setup*.

bit — The smallest unit of data interpreted by your computer.

Bluetooth® wireless technology — A wireless technology standard for short-range (9 m [29 feet]) networking devices that allows for enabled devices to automatically recognize each other.

boot sequence — Specifies the order of the devices from which the computer attempts to boot.

bootable CD — A CD that you can use to start your computer. In case your hard drive is damaged or your computer has a virus, ensure that you always have a bootable CD or floppy disk available. Your *Drivers and Utilities* media (or *ResourceCD*) is a bootable CD or DVD.

bootable disk — A disk that you can use to start your computer. In case your hard drive is damaged or your computer has a virus, ensure that you always have a bootable CD, DVD, or floppy disk available.

bps — bits per second — The standard unit for measuring data transmission speed.

BTU — British thermal unit — A measurement of heat output.

bus — A communication pathway between the components in your computer.

bus speed — The speed, given in MHz, that indicates how fast a bus can transfer information.

byte — The basic data unit used by your computer. A byte is usually equal to 8 bits.

C

C — Celsius — A temperature measurement scale where 0° is the freezing point and 100° is the boiling point of water.

cache — A special high-speed storage mechanism which can be either a reserved section of main memory or an independent high-speed storage device. The cache enhances the efficiency of many processor operations.

L1 cache — Primary cache stored inside the processor.

L2 cache — Secondary cache which can either be external to the processor or incorporated into the processor architecture.

carnet — An international customs document that facilitates temporary imports into foreign countries. Also known as a *merchandise passport*.

CD-R — CD recordable — A recordable version of a CD. Data can be recorded only once onto a CD-R. Once recorded, the data cannot be erased or written over.

CD-RW — CD rewritable — A rewritable version of a CD. Data can be written to a CD-RW disc, and then erased and written over (rewritten).

CD-RW drive — A drive that can read CDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

CD-RW/DVD drive — A drive, sometimes referred to as a combo drive, that can read CDs and DVDs and write to CD-RW (rewritable CDs) and CD-R (recordable CDs) discs. You can write to CD-RW discs multiple times, but you can write to CD-R discs only once.

clock speed — The speed, given in MHz, that indicates how fast computer components that are connected to the system bus operate.

COA — Certificate of Authenticity — The Windows alpha-numeric code located on a sticker on your computer. Also referred to as the *Product Key* or *Product ID*.

Control Panel — A Windows utility that allows you to modify operating system and hardware settings, such as display settings.

controller — A chip that controls the transfer of data between the processor and memory or between the processor and devices.

CRIMM — continuity rambus in-line memory module — A special module that has no memory chips and is used to fill unused RIMM slots.

cursor — The marker on a display or screen that shows where the next keyboard, touch pad, or mouse action will occur. It often is a blinking solid line, an underline character, or a small arrow.

D

DCM — Dell Client Manager. Dell's utility for remote management

DDR SDRAM — double-data-rate SDRAM — A type of SDRAM that doubles the data burst cycle, improving system performance.

DDR2 SDRAM — double-data-rate 2 SDRAM — A type of DDR SDRAM that uses a 4-bit prefetch and other architectural changes to boost memory speed to over 400 MHz.

device — Hardware such as a disk drive, printer, or keyboard that is installed in or connected to your computer.

device driver — See *driver*.

DIMM — dual in-line memory module — A circuit board with memory chips that connects to a memory module on the system board.

DIN connector — A round, six-pin connector that conforms to DIN (Deutsche Industrie-Norm) standards; it is typically used to connect PS/2 keyboard or mouse cable connectors.

disk striping — A technique for spreading data over multiple disk drives. Disk striping can speed up operations that retrieve data from disk storage. Computers that use disk striping generally allow the user to select the data unit size or stripe width.

DMA — direct memory access — A channel that allows certain types of data transfer between RAM and a device to bypass the processor.

docking device — See *APR*.

DMTF — Distributed Management Task Force — A consortium of hardware and software companies who develop management standards for distributed desktop, network, enterprise, and Internet environments.

domain — A group of computers, programs, and devices on a network that are administered as a unit with common rules and procedures for use by a specific group of users. A user logs on to the domain to gain access to the resources.

DRAM — dynamic random-access memory — Memory that stores information in integrated circuits containing capacitors.

driver — Software that allows the operating system to control a device such as a printer. Many devices do not work properly if the correct driver is not installed in the computer.

DSL — Digital Subscriber Line — A technology that provides a constant, high-speed Internet connection through an analog telephone line.

dual-core — An Intel® technology in which two physical computational units exist inside a single processor package, thereby increasing computing efficiency and multi-tasking ability.

dual display mode — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as *extended display mode*.

DVD+R — DVD recordable — A recordable version of a DVD. Data can be recorded only once onto a DVD+R. Once recorded, the data cannot be erased or written over. DVD+R technology is different from DVD-R technology.

DVD-R — DVD recordable — A recordable version of a DVD. Data can be recorded only once onto a DVD-R. Once recorded, the data cannot be erased or written over. DVD-R technology is different from DVD+R technology.

DVD+RW — DVD rewritable — A rewritable version of a DVD. Data can be written to a DVD+RW disc, and then erased and written over (rewritten). DVD+RW technology is different from DVD-RW technology.

DVD-RW — DVD rewritable — A rewritable version of a DVD. Data can be written to a DVD-RW disc, and then erased and written over (rewritten). DVD-RW technology is different from DVD+RW technology)

DVD+/-RW drive — drive that can read DVDs and most CD media and write to DVD+/-RW (rewritable DVDs) media.

DVI — digital video interface — A standard for digital transmission between a computer and a digital video display.

E

ECC — error checking and correction — A type of memory that includes special circuitry for testing the accuracy of data as it passes in and out of memory.

ECP — extended capabilities port — A parallel connector design that provides improved bidirectional data transmission. Similar to EPP, ECP uses direct memory access to transfer data and often improves performance.

EIDE — enhanced integrated device electronics — An improved version of the IDE interface for hard drives and CD drives.

EMI — electromagnetic interference — Electrical interference caused by electromagnetic radiation.

ENERGY STAR® — Environmental Protection Agency requirements that decrease the overall consumption of electricity.

EPP — enhanced parallel port — A parallel connector design that provides bidirectional data transmission.

ESD — electrostatic discharge — A rapid discharge of static electricity. ESD can damage integrated circuits found in computer and communications equipment.

expansion card — A circuit board that installs in an expansion slot on the system board in some computers, expanding the capabilities of the computer. Examples include video, modem, and sound cards.

expansion slot — A connector on the system board (in some computers) where you insert an expansion card, connecting it to the system bus.

ExpressCard — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of ExpressCards. ExpressCards support both the PCI Express and USB 2.0 standard.

Express Service Code — A numeric code located on a sticker on your Dell™ computer. Use the Express Service Code when contacting Dell for assistance. Express Service Code service may not be available in some countries.

extended display mode — A display setting that allows you to use a second monitor as an extension of your display. Also referred to as *dual display mode*.

extended PC Card — A PC Card that extends beyond the edge of the PC Card slot when installed.

F

Fahrenheit — A temperature measurement scale where 32° is the freezing point and 212° is the boiling point of water.

FBD — fully-buffered DIMM — A DIMM with DDR2 DRAM chips and an Advanced Memory Buffer (AMB) that speeds communication between the DDR2 SDRAM chips and the system.

FCC — Federal Communications Commission — A U.S. agency responsible for enforcing communications-related regulations that state how much radiation computers and other electronic equipment can emit.

fingerprint reader — A strip sensor that uses your unique fingerprint to authenticate your user identity to help secure your computer.

folder — A term used to describe space on a disk or drive where files are organized and grouped. Files in a folder can be viewed and ordered in various ways, such as alphabetically, by date, and by size.

format — The process that prepares a drive or disk for file storage. When a drive or disk is formatted, the existing information on it is lost.

FSB — front side bus — The data path and physical interface between the processor and RAM.

FTP — file transfer protocol — A standard Internet protocol used to exchange files between computers connected to the Internet.

G

G — gravity — A measurement of weight and force.

GB — gigabyte — A measurement of data storage that equals 1024 MB (1,073,741,824 bytes). When used to refer to hard drive storage, the term is often rounded to 1,000,000,000 bytes.

GHz — gigahertz — A measurement of frequency that equals one thousand million Hz, or one thousand MHz. The speeds for computer processors, buses, and interfaces are often measured in GHz.

graphics mode — A video mode that can be defined as *x* horizontal pixels by *y* vertical pixels by *z* colors. Graphics modes can display an unlimited variety of shapes and fonts.

GUI — graphical user interface — Software that interacts with the user by means of menus, windows, and icons. Most programs that operate on the Windows operating systems are GUIs.

H

hard drive — A drive that reads and writes data on a hard disk. The terms hard drive and hard disk are often used interchangeably.

heat sink — A metal plate on some processors that helps dissipate heat.

hibernate mode — A power management mode that saves everything in memory to a reserved space on the hard drive and then turns off the computer. When you restart the computer, the memory information that was saved to the hard drive is automatically restored.

HTTP — hypertext transfer protocol — A protocol for exchanging files between computers connected to the Internet.

Hyperthreading — hyperthreading is an Intel technology that can enhance overall computer performance by allowing one physical processor to function as two logical processors, capable of performing certain tasks simultaneously.

Hz — hertz — A unit of frequency measurement that equals 1 cycle per second. Computers and electronic devices are often measured in kilohertz (kHz), megahertz (MHz), gigahertz (GHz), or terahertz (THz).

I

iAMT - Intel® Active Management Technology (Intel® AMT) Using built-in platform capabilities and popular third-party management and security applications, Intel AMT allows IT to better detect, repair, and protect their networked computing assets.

IC — integrated circuit — A semiconductor wafer, or chip, on which thousands or millions of tiny electronic components are fabricated for use in computer, audio, and video equipment.

IDE — integrated device electronics — An interface for mass storage devices in which the controller is integrated into the hard drive or CD drive.

IEEE 1394 — Institute of Electrical and Electronics Engineers, Inc. — A high-performance serial bus used to connect IEEE 1394-compatible devices, such as digital cameras and DVD players, to the computer.

infrared sensor — A port that allows you to transfer data between the computer and infrared-compatible devices without using a cable connection.

integrated — Usually refers to components that are physically located on the computer's system board. Also referred to as *built-in*.

I/O — input/output — An operation or device that enters and extracts data from your computer. Keyboards and printers are I/O devices.

I/O address — An address in RAM that is associated with a specific device (such as a serial connector, parallel connector, or expansion slot) and allows the processor to communicate with that device.

IrDA — Infrared Data Association — The organization that creates international standards for infrared communications.

IRQ — interrupt request — An electronic pathway assigned to a specific device so that the device can communicate with the processor. Each device connection must be assigned an IRQ. Although two devices can share the same IRQ assignment, you cannot operate both devices simultaneously.

ISP — Internet service provider — A company that allows you to access its host server to connect directly to the Internet, send and receive e-mail, and access websites. The ISP typically provides you with a software package, user name, and access phone numbers for a fee.

K

Kb — kilobit — A unit of data that equals 1024 bits. A measurement of the capacity of memory integrated circuits.

KB — kilobyte — A unit of data that equals 1024 bytes but is often referred to as 1000 bytes.

key combination — A command requiring you to press multiple keys at the same time.

kHz — kilohertz — A measurement of frequency that equals 1000 Hz.

L

LAN — local area network — A computer network covering a small area. A LAN usually is confined to a building or a few nearby buildings. A LAN can be connected to another LAN over any distance through telephone lines and radio waves to form a wide area network (WAN).

LCD — liquid crystal display — The technology used by portable computer and flat-panel displays.

LED — light-emitting diode — An electronic component that emits light to indicate the status of the computer.

local bus — A data bus that provides a fast throughput for devices to the processor.

LPT — line print terminal — The designation for a parallel connection to a printer or other parallel device.

M

Mb — megabit — A measurement of memory chip capacity that equals 1024 Kb.

Mbps — megabits per second — One million bits per second. This measurement is typically used for transmission speeds for networks and modems.

MB — megabyte — A measurement of data storage that equals 1,048,576 bytes. 1 MB equals 1024 KB. When used to refer to hard drive storage, the term is often rounded to 1,000,000 bytes.

MB/sec — megabytes per second — One million bytes per second. This measurement is typically used for data transfer ratings.

media bay — A bay that supports devices such as optical drives, a second battery, or a Dell TravelLite™ module.

memory — A temporary data storage area inside your computer. Because the data in memory is not permanent, it is recommended that you frequently save your files while you are working on them, and always save your files before you shut down the computer. Your computer can contain several different forms of memory, such as RAM, ROM, and video memory. Frequently, the word memory is used as a synonym for RAM.

memory address — A specific location where data is temporarily stored in RAM.

memory mapping — The process by which the computer assigns memory addresses to physical locations at start-up. Devices and software can then identify information that the processor can access.

memory module — A small circuit board containing memory chips, which connects to the system board.

MHz — megahertz — A measure of frequency that equals 1 million cycles per second. The speeds for computer processors, buses, and interfaces are often measured in MHz.

Mini PCI — A standard for integrated peripheral devices with an emphasis on communications such as modems and NICs. A Mini PCI card is a small external card that is functionally equivalent to a standard PCI expansion card.

Mini-Card — A small card designed for integrated peripherals, such as communication NICs. The Mini-Card is functionally equivalent to a standard PCI expansion card.

mirroring — Duplication of data onto another computer at another location. Mirroring is performed for backup purposes or to be in close proximity to the user.

modem — A device that allows your computer to communicate with other computers over analog telephone lines. Three types of modems include: external, PC Card, and internal. You typically use your modem to connect to the Internet and exchange e-mail.

module bay — See *media bay*.

MP — megapixel — A measure of image resolution used for digital cameras.

ms — millisecond — A measure of time that equals one thousandth of a second. Access times of storage devices are often measured in ms.

N

network adapter — A chip that provides network capabilities. A computer may include a network adapter on its system board, or it may contain a PC Card with an adapter on it. A network adapter is also referred to as a *NIC* (network interface controller).

NIC — See *network adapter*.

notification area — The section of the Windows taskbar that contains icons for providing quick access to programs and computer functions, such as the clock, volume control, and print status. Also referred to as *system tray*.

ns — nanosecond — A measure of time that equals one billionth of a second.

NVRAM — nonvolatile random access memory — A type of memory that stores data when the computer is turned off or loses its external power source. NVRAM is used for

maintaining computer configuration information such as date, time, and other system setup options that you can set.

O

optical drive — A drive that uses optical technology to read or write data from CDs, DVDs, or DVD+RWs. Example of optical drives include CD drives, DVD drives, CD-RW drives, and CD-RW/DVD combo drives.

P

parallel connector — An I/O port often used to connect a parallel printer to your computer. Also referred to as an *LPT port*.

partition — A physical storage area on a hard drive that is assigned to one or more logical storage areas known as logical drives. Each partition can contain multiple logical drives.

PC Card — A removable I/O card adhering to the PCMCIA standard. Modems and network adapters are common types of PC Cards.

PCI — peripheral component interconnect — PCI is a local bus that supports 32-and 64-bit data paths, providing a high-speed data path between the processor and devices such as video, drives, and networks.

PCI Express — A modification to the PCI interface that boosts the data transfer rate between the processor and the devices attached to it. PCI Express can transfer data at speeds from 250 MB/sec to 4 GB/sec. If the PCI Express chip set and the device are capable of different speeds, they will operate at the slower speed.

PCMCIA — Personal Computer Memory Card International Association — The organization that establishes standards for PC Cards.

PIO — programmed input/output — A method of transferring data between two devices through the processor as part of the data path.

pixel — A single point on a display screen. Pixels are arranged in rows and columns to create an image. A video resolution, such as 800 x 600, is expressed as the number of pixels across by the number of pixels up and down.

Plug-and-Play — The ability of the computer to automatically configure devices. Plug and Play provides automatic installation, configuration, and compatibility with existing hardware if the BIOS, operating system, and all devices are Plug and Play compliant.

POST — power-on self-test — Diagnostics programs, loaded automatically by the BIOS, that perform basic tests on the major computer components, such as memory, hard drives, and video. If no problems are detected during POST, the computer continues the start-up.

processor — A computer chip that interprets and executes program instructions. Sometimes the processor is referred to as the CPU (central processing unit).

PS/2 — personal system/2 — A type of connector for attaching a PS/2-compatible keyboard, mouse, or keypad.

PXE — pre-boot execution environment — A WfM (Wired for Management) standard that allows networked computers that do not have an operating system to be configured and started remotely.

R

RAID — redundant array of independent disks — A method of providing data redundancy. Some common implementations of RAID include RAID 0, RAID 1, RAID 5, RAID 10, and RAID 50.

RAM — random-access memory — The primary temporary storage area for program instructions and data. Any information stored in RAM is lost when you shut down your computer.

readme file — A text file included with a software package or hardware product. Typically, readme files provide installation information and describe new product enhancements or corrections that have not yet been documented.

read-only — Data and/or files you can view but cannot edit or delete. A file can have read-only status if:

- It resides on a physically write-protected floppy disk, CD, or DVD.
- It is located on a network in a directory and the system administrator has assigned rights only to specific individuals.

refresh rate — The frequency, measured in Hz, at which your screen's horizontal lines are recharged (sometimes also referred to as its *vertical frequency*). The higher the refresh rate, the less video flicker can be seen by the human eye.

resolution — The sharpness and clarity of an image produced by a printer or displayed on a monitor. The higher the resolution, the sharper the image.

RFI — radio frequency interference — Interference that is generated at typical radio frequencies, in the range of 10 kHz to 100,000 MHz. Radio frequencies are at the lower end of the electromagnetic frequency spectrum and are more likely to have interference than the higher frequency radiations, such as infrared and light.

ROM — read-only memory — Memory that stores data and programs that cannot be deleted or written to by the computer. ROM, unlike RAM, retains its contents after you shut down your computer. Some programs essential to the operation of your computer reside in ROM.

RPM — revolutions per minute — The number of rotations that occur per minute. Hard drive speed is often measured in rpm.

RTC — real time clock — Battery-powered clock on the system board that keeps the date and time after you shut down the computer.

RTCRST — real-time clock reset — A jumper on the system board of some computers that can often be used for troubleshooting problems.

S

SAS — serial attached SCSI — A faster, serial version of the SCSI interface (as opposed to the original SCSI parallel architecture).

SATA — serial ATA — A faster, serial version of the ATA (IDE) interface.

ScanDisk — A Microsoft utility that checks files, folders, and the hard disk's surface for errors. ScanDisk often runs when you restart the computer after it has stopped responding.

SCSI — small computer system interface — A high-speed interface used to connect devices to a computer, such as hard drives, CD drives, printers, and scanners. The SCSI can connect many devices using a single controller. Each device is accessed by an individual identification number on the SCSI controller bus.

SDRAM — synchronous dynamic random-access memory — A type of DRAM that is synchronized with the optimal clock speed of the processor.

serial connector — An I/O port often used to connect devices such as a handheld digital device or digital camera to your computer.

Service Tag — A bar code label on your computer that identifies your computer when you access Dell Support at **support.dell.com** or when you call Dell for customer service or technical support.

setup program — A program that is used to install and configure hardware and software. The **setup.exe** or **install.exe** program comes with most Windows software packages. *Setup program* differs from *system setup*.

shortcut — An icon that provides quick access to frequently used programs, files, folders, and drives. When you place a shortcut on your Windows desktop and double-click the icon, you can open its corresponding folder or file without having to find it first. Shortcut icons do not change the location of files. If you delete a shortcut, the original file is not affected. Also, you can rename a shortcut icon.

SIM — Subscriber Identity Module — A SIM card contains a microchip that encrypts voice and data transmissions. SIM cards can be used in phones or portable computers.

smart card — A card that is embedded with a processor and a memory chip. Smart cards can be used to authenticate a user on computers equipped for smart cards.

S/PDIF — Sony/Philips Digital Interface — An audio transfer file format that allows the transfer of audio from one file to another without converting it to and from an analog format, which could degrade the quality of the file.

standby mode — A power management mode that shuts down all unnecessary computer operations to save energy.

StrikeZone™ — Reinforced area of the platform base that protects the hard drive by acting as a dampening device when a computer experiences resonating shock or is dropped (whether the computer is on or off).

surge protectors — Prevent voltage spikes, such as those that may occur during an electrical storm, from entering the computer through the electrical outlet. Surge protectors do not protect against lightning strikes or against brownouts, which occur when the voltage drops more than 20 percent below the normal AC-line voltage level.

Network connections cannot be protected by surge protectors. Always disconnect the network cable from the network connector during electrical storms.

SVGA — super-video graphics array — A video standard for video cards and controllers. Typical SVGA resolutions are 800 x 600 and 1024 x 768.

The number of colors and resolution that a program displays depends on the capabilities of the monitor, the video controller and its drivers, and the amount of video memory installed in the computer.

S-video TV-out — A connector used to attach a TV or digital audio device to the computer.

SXGA — super-extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 1024.

SXGA+ — super-extended graphics array plus — A video standard for video cards and controllers that supports resolutions up to 1400 x 1050.

system board — The main circuit board in your computer. Also known as the *system board*.

system setup — A utility that serves as an interface between the computer hardware and the operating system. System setup allows you to configure user-selectable options in the BIOS, such as date and time or system password. Unless you understand what effect the settings have on the computer, do not change the settings for this program.

T

TAPI — telephony application programming interface — Enables Windows programs to operate with a wide variety of telephony devices, including voice, data, fax, and video.

text editor — A program used to create and edit files that contain only text; for example, Windows Notepad uses a text editor. Text editors do not usually provide word wrap or formatting functionality (the option to underline, change fonts, and so on).

TPM — trusted platform module — A hardware-based security feature that when combined with security software enhances network and computer security by enabling features such as file and e-mail protection.

travel module — A plastic device designed to fit inside the module bay of a portable computer to reduce the weight of the computer.

U

UMA — unified memory allocation — System memory dynamically allocated to video.

UPS — uninterruptible power supply — A backup power source used when the electrical power fails or drops to an unacceptable voltage level. A UPS keeps a computer running for a limited amount of time when there is no electrical power. UPS systems typically provide surge suppression and may also provide voltage regulation. Small UPS systems provide battery power for a few minutes to enable you to shut down your computer.

USB — universal serial bus — A hardware interface for a low-speed device such as a USB-compatible keyboard, mouse, joystick, scanner, set of speakers, printer, broadband devices (DSL and cable modems), imaging devices, or storage devices. Devices are plugged directly in to a 4-pin socket on your computer or in to a multi-port hub that plugs in to your computer. USB devices can be connected and disconnected while the computer is turned on, and they can also be daisy-chained together.

UTP — unshielded twisted pair — Describes a type of cable used in most telephone networks and some computer networks. Pairs of unshielded wires are twisted to protect against electromagnetic interference, rather than relying on a metal sheath around each pair of wires to protect against interference.

UXGA — ultra extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1600 x 1200.

V

video controller — The circuitry on a video card or on the system board (in computers with an integrated video controller) that provides the video capabilities—in combination with the monitor—for your computer.

video memory — Memory that consists of memory chips dedicated to video functions. Video memory is usually faster than system memory. The amount of video memory installed primarily influences the number of colors that a program can display.

video mode — A mode that describes how text and graphics are displayed on a monitor. Graphics-based software, such as Windows operating systems, displays in video modes that can be defined as *x* horizontal pixels by *y* vertical pixels by *z* colors. Character-based software, such as text editors, displays in video modes that can be defined as *x* columns by *y* rows of characters.

video resolution — See *resolution*.

virus — A program that is designed to inconvenience you or to destroy data stored on your computer. A virus program moves from one computer to another through an infected disk, software downloaded from the Internet, or e-mail attachments. When an infected program starts, its embedded virus also starts.

A common type of virus is a boot virus, which is stored in the boot sectors of a floppy disk. If the floppy disk is left in the drive when the computer is shut down and then turned on, the computer is infected when it reads the boot sectors of the floppy disk expecting to find the operating system. If the computer is infected, the boot virus may replicate itself onto all the floppy disks that are read or written in that computer until the virus is eradicated.

V — volt — The measurement of electric potential or electromotive force. One V appears across a resistance of 1 ohm when a current of 1 ampere flows through that resistance.

W

W — watt — The measurement of electrical power. One W is 1 ampere of current flowing at 1 volt.

WHr — watt-hour — A unit of measure commonly used to indicate the approximate capacity of a battery. For example, a 66-WHr battery can supply 66 W of power for 1 hour or 33 W for 2 hours.

wallpaper — The background pattern or picture on the Windows desktop. Change your wallpaper through the Windows Control Panel. You can also scan in your favorite picture and make it wallpaper.

WLAN — wireless local area network. A series of interconnected computers that communicate with each other over the air waves using access points or wireless routers to provide Internet access.

write-protected — Files or media that cannot be changed. Use write-protection when you want to protect data from being changed or destroyed. To write-protect a 3.5-inch floppy disk, slide its write-protect tab to the open position.

WWAN — wireless wide area network. A wireless high-speed data network using cellular technology and covering a much larger geographic area than WLAN.

WXGA — wide-aspect extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1280 x 800.

X

XGA — extended graphics array — A video standard for video cards and controllers that supports resolutions up to 1024 x 768.

Z

ZIF — zero insertion force — A type of socket or connector that allows a computer chip to be installed or removed with no stress applied to either the chip or its socket.

Zip — A popular data compression format. Files that have been compressed with the Zip format are called Zip files and usually have a filename extension of **.zip**. A special kind of zipped file is a self-extracting file, which has a filename extension of **.exe**. You can unzip a self-extracting file by double-clicking it.

Zip drive — A high-capacity floppy drive developed by Iomega Corporation that uses 3.5-inch removable disks called Zip disks. Zip disks are slightly larger than regular floppy disks, about twice as thick, and hold up to 100 MB of data.